THE IRON TRADE REVIEW

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# Buying Starts in Earnest

**Many Melters Represented in Large Pig Iron Tonnage and Prices Are Higher at Buffalo—More Activity in Some Finished Lines**

Heavy buying of pig iron and a fair increase in business in finished materials have been the leading features of the very encouraging improvement of the past few days. As is usual, when a period of recovery is inaugurated after a profound depression, sales are being made at very low prices, but pig iron quotations have been advanced at Buffalo and the tone of the market in that center is distinctly firmer.

**Pig Iron**

The American Radiator Co. has purchased 100,000 to 125,000 tons of pig iron for its various plants. A large part of this tonnage will come from Buffalo, at about $12 per ton, and it is estimated that sales in the Buffalo district during the past two weeks have been nearly 200,000 tons. Following the heavy sales of last week, prices have been advanced nearly, if not quite, $1 per ton, and furnaces have very little to sell for delivery prior to April 1. The clearing up of the Buffalo situation, which has been the weakest spot on the pig iron map, will have important influence in other districts. Already at Chicago there is a flood of inquiries and Cleveland agencies report a decided increase in sales of tonnages ranging from 300 to 500, indicating that many of the smaller companies, as well as some of the largest consumers, are convinced that the present is the time to buy. The outlook is that those who do not place their orders promptly will face rapidly advancing quotations.

**Railroad Buying**

The Illinois Southern has placed an order for 300 box cars with the Haskell & Barker Car Co. The Boston Elevated is inquiring for 100 steel coaches. The New York Central railroad has placed all of the 25,000 tons of steel rails, for which it has been inquiring, with the Lackawanna Steel Co.

**Machinery**

Companies in this country which have booked large orders for shrapnel and other materials for belligerent powers in Europe are freely placing orders for machine tools. The Bethlehem Steel Co. has placed orders for about $200,000 worth of machine tools and will close shortly for even a larger number.

**Finished Material**

In shapes, plates and bars, reports vary somewhat as to improvement in demand in different sections, but reports of low prices are general. Even wire products are showing some irregularity and tin plate quotations are very uncertain. Very low prices are being named on reinforcing bars of new steel in competition with the re-rolled product. Italian manufacturers are inquiring for large tonnages of sheets which heretofore have been obtained from Germany and Belgium. There is still considerable shading on sheet quotations.

**Coke**

Following the announcement of heavy sales of pig iron, the coke market shows much more activity. It is expected that more blast furnaces will soon be blown in and that the demand for coke will be brisk. The Buffalo Union Furnace Co. is inquiring for 10,000 tons per month for two years; the Wickwire Steel Co. is also inquiring for coke for extended delivery; a southern Ohio furnace has purchased 50,000 tons of by-product furnace coke, and a Lehigh valley furnace has contracted for 20,000 tons for first half delivery.

# THE OPEN HEARTH

## The Truth About the Cuyuna

A PERIOD of golden opportunity for legitimate expansion and development is likely to be accompanied by the exploiting of many schemes of very doubtful merit and not infrequently men who are thoroughly dishonest are able to rob others of hard-earned dollars. When the development of the country's natural resources is advocated very properly, as is being done by many nowadays, others show wonderful ability in deceiving those who are looking for chances to invest.

When, early in August, it became apparent that there might be considerable difficulty in obtaining sufficient supplies of ferro-manganese to meet the requirements of the steel manufacturers of the United States, tales of wonderful deposits of manganese ore were published. From numerous widely separated points of the country came reports of fabulous wealth awaiting development and some of the most marvelous stories centered in the Cuyuna iron range, Minnesota. Statements were widely circulated as to the very extensive deposits of manganese ore on that newly discovered range and it was extremely difficult to get any kind of exact information. Fortunately, however, the state of Minnesota has a Tax Commission of great ability, honesty and courage and the result of the hearings recently held, following elaborate investigations, is that the Commission has come to the conclusion that no manganese ore in commercial quantity, that is, no ore analyzing 40 per cent manganese, exists on the Cuyuna range. The so-called manganese ore is a manganiferous ore of uncertain value. Most of it is too high in iron and too low in manganese for the manufacture of ferro-manganese or spiegeleisen, or when the manganese contained is fairly high, the ore is so high in phosphorus and silica that it cannot be used in making the alloys. Much of this manganiferous ore is so low in iron that it has little, if any, market value.

The comment of Attorney Russell, of Brainerd, Minn., quoted elsewhere in this issue, was indeed timely, for, after the recent developments, no one who takes any trouble to investigate will be deceived by the false representations made by stock-selling companies formed to deal in manganese ore on the Cuyuna range. Some of these companies may have been formed in good faith and honest men connected with them will be glad to know the facts as developed by the Tax Commission.

This latest achievement of the Minnesota Tax Commission is in harmony with its record of high efficiency. Its stupendous work in arriving at the taxable value of mineral property has no parallel in the world. The entire developed iron ore tonnage of all the mines in Michigan could be contained in the open pits of the Hull-Rust and Mahoning mines on the Mesabi range. Estimates as to Mesabi tonnages were originally furnished by operators and carried as taxable tonnage until they could be verified by the mining engineers of the commission and proper adjustment made. Professor E. P. McCarty, of the School of Mines, University of Minnesota, with his assistants, has verified, measured and calculated approximately one and a half billion tons of Mesabi and Vermillion ore for the commission. This is a positive and definitely known quantity and not an estimate as ordinarily used in mine practice. In the case of the Cuyuna range, the commission was confronted by estimates of from 400,000,000 to 500,000,000 tons or over made by newspapers, promoters, alleged experts and speculators. One property alone was repeatedly reported to contain over 200,000,000 tons. Few, if any, of the operators or owners would, or indeed could, properly estimate their developed tonnage and the commission called for complete exploration drill reports and mine maps. Then it made its own measurements or calculations to determine all grades of ore and classes of ore. The result was that the commission has determined that there are 70,857,865 tons of merchantable ore and 13,907,949 tons of low grade iron and manganiferous ores. The geological formation has also been determined and the tonnage developed is of such an extent as to establish the grade of any additional ore of the future as well as that of the present development. This is indeed a public service of great value and is deserving of the highest commendation.

# THE OPEN HEARTH

## Preparing for Prosperity

SITTING on the bench of the United States district court at Cleveland is a judge who has a plain, common-sense way of looking at things. For many years before being appointed a judge, he was closely connected as an attorney with railroads and other lines of business. He is Judge John H. Clarke, and he took a trip the other day over the Wheeling & Lake Erie railroad, which is in the hands of a receiver, William M. Duncan. Judge Clarke was surprised by some of the conditions which he discovered and when he returned to Cleveland he wrote a letter to Mr. Duncan. Judge Clarke in making the trip noticed that the car and engine repair shops were practically shut down.

"Upon inquiry," said the judge in his letter to Mr. Duncan, "you informed me that this condition had been continued for over two months. The result of this policy is that you have now between 18 and 20 per cent of the freight cars of the company so out of repair that they cannot be used as against a normal percentage in that condition of from 2 to 4 per cent and about 30 per cent of the engines are not in condition for use. You advise me that this policy is adopted to the end that by this rigid economy you may be able to make from the earnings of the lines certain interest payments which fall due in February and March next. Of course, such practice serves only to postpone the expenditure of money for the repairs of cars and engines."

Judge Clarke adds that this policy of extreme economy is neither a wise one economically considered nor a just one from a social point of view, having regard to the welfare of the men employed. He therefore directs the receiver to employ such repair force as may be necessary to prevent further accumulation of cars not in condition fit for use and to reduce the number now out of repair as rapidly as the expense of doing so can be paid from the earnings of the line. If business revives at an early date, concludes the judge, there will be no difficulty in meeting the fixed charges due in February and March, and if it does not revive, other provisions will have to be made for the making of these payments.

Receiver Duncan cordially concurs with Judge Clarke and the shops will be opened. We believe it would be well for railroad men throughout the country to consider whether they are acting wisely in pursuing a policy similar to that which has been in vogue on the Wheeling & Lake Erie. This country is now facing a period of great prosperity. If the railroads do not put their house in order, they will not be able to meet the demands which will be made upon them at a not far distant date. If a road in the hands of a receiver can make repairs this winter, many other roads not in hands of receivers ought to be able to do so.

## No Cause for Alarm

THE opinion frequently expressed in these columns that the Clayton bill as finally enacted is not a dangerous measure is in harmony with the address made at the convention last week of the National Founders' Association by James A. Emery, counsel for the National Council for Industrial Defense, who described the Clayton law as a political sop thrown to the labor unions. He declared that labor organizations not only have not been exempted from the prohibitions of the Sherman act, but that the remedies that private individuals have against them for violations of that act have been very considerably enlarged. Mr. Emery also discussed other features of the law, particularly those relating to the general injunctive powers of the courts, but he found no reason for alarm. He stated, however, that there is considerable ambiguous language in the law and that the decisions of the highest courts must be awaited before the effects of certain provisions become definitely known.

The claims made by labor leaders since the passage of the Clayton law differ radically from the views expressed by such men as Daniel Davenport, Mr. Emery, and others, and it is probable that if the views of the latter prove to be correct, the labor unions will not be slow in making demands on Congress for further legislation. But that is a matter of the distant future. The important fact at present is that business men need not entertain feelings of apprehension in regard to the effects of the Clayton law.

## Prices Present and Past

*Quotations on leading products today, average for last month, average for three months ago and average for November 1913. Prices are those ruling in the largest percentage of sales at the dates named.*

| | Today's prices. | Average for Oct., 1914. | Average for Aug., 1914. | Average for Nov., 1913. |
|---|---|---|---|---|
| Bessemer pig iron, Pittsburgh.. | $14.70 | $14.85 | $14.90 | $16.09 |
| Basic pig iron, Pittsburgh..... | 13.45 | 13.75 | 13.90 | 14.09 |
| No. 2 Fdy. pig iron, Pittsburgh | 13.70 | 13.80 | 13.90 | 14.59 |
| Northern No. 2 Fdy., Chgo.... | 13.00 | 13.50 | 14.00 | 15.00 |
| Lake Superior Charcoal, Chgo.. | 16.00 | 15.75 | 15.75 | 15.50 |
| Malleable, Bessemer, Chicago... | 13.00 | 13.50 | 14.00 | 15.00 |
| Southern No. 2, Birmingham... | 10.00 | 10.00 | 10.13 | 10.50 |
| Southern Ohio No. 2, Ironton.. | 13.00 | 13.00 | 13.38 | 13.56 |
| Basic, eastern Pa..... | 13.50 | 14.00 | 14.00 | 15.00 |
| No. 2X Virginia furnace..... | 12.50 | 12.50 | 12.50 | 13.00 |
| No. 2X Foundry, Philadelphia.. | 14.25 | 14.50 | 14.75 | 15.50 |
| Ferro mang., Balti..... | 68.00 | 68.00 | 100.00 | 50.00 |
| Billets, Pbgh. ..... | 19.00 | 20.00 | 20.00 | 20.87 |
| Sheet bars, Pbgh..... | 19.50 | 21.00 | 21.00 | 21.75 |
| Steel bars, Chicago..... | 1.28 | 1.30 | 1.36 | 1.48 |
| Steel bars, Pittsburgh..... | 1.10 | 1.17 | 1.17½ | 1.31 |
| Iron bars, Philadelphia..... | 1.15 | 1.20 | 1.20 | 1.37 |
| Iron bars, Cleveland, local del'y. | 1.20 | 1.20 | 1.20 | 1.35 |
| Iron bars, Chgo. mill..... | .95 | 1.05 | 1.07 | 1.15 |

| | Today's prices. | Average for Oct., 1914. | Average for Aug., 1914. | Average for Nov., 1913. |
|---|---|---|---|---|
| Beams, Chicago ..... | $1.28 | $1.30 | $1.36 | $1.48 |
| Beams, Pittsburgh ..... | 1.10 | 1.17 | 1.17½ | 1.30 |
| Beams, Philadelphia ..... | 1.25 | 1.30 | 1.30 | 1.40 |
| Tank plates, Pittsburgh..... | 1.05 | 1.14 | 1.16 | 1.25 |
| Tank plates, Chicago..... | 1.28 | 1.30 | 1.36 | 1.43 |
| Tank plates, Philadelphia..... | 1.25 | 1.30 | 1.30 | 1.45 |
| Sheets, blk., No. 28, Pittsburgh | 1.85 | 1.93 | 1.88 | 1.97 |
| Sheets, blue an., No. 10, Pbgh. | 1.35 | 1.40 | 1.37½ | 1.47 |
| Sheets, galv., No. 28. Pbgh.... | 2.85 | 2.93 | 2.85 | 2.97 |
| Wire nails, Pittsburgh..... | 1.55 | 1.59 | 1.55 | 1.59 |
| Connellsville fur. coke, contr... | 1.65 | 1.67 | 1.80 | 1.81 |
| Connellsville fdy. coke contr... | 2.25 | 2.25 | 2.36 | 2.54 |
| Heavy melting steel, Pbgh..... | 10.00 | 10.75 | 11.50 | 11.00 |
| Heavy melting steel, east'n Pa. | 9.50 | 9.75 | 10.75 | 10.25 |
| Heavy melting steel, Chgo..... | 8.25 | 9.00 | 9.50 | 9.00 |
| No. 1 wrought eastern Pa..... | 11.00 | 11.75 | 12.25 | 13.50 |
| No. 1 wrought, Chgo..... | 7.50 | 7.75 | 8.75 | 8.75 |
| Rerolling rails, Chgo..... | 9.50 | 10.00 | 11.25 | 12.00 |
| Car wheels, Chgo..... | 10.00 | 10.50 | 11.00 | 12.50 |

(For Additional Prices See Page 1014.)

# Heavy Orders for Pig Iron Placed

### Sales Made by Buffalo Furnaces Estimated at 150,000 Tons—American Radiator Co. and American Steel Foundries Buy Large Tonnages

Buffalo, Nov. 23.—Heavy buying by the American Radiator Co. and other interests brought the pig iron sales of the Buffalo district up to 150,000 tons for the week. This in turn has stiffened prices and caused the $12 and $12.25 iron to disappear from the market. An advance of $1 per ton has been added to quotations for deliveries over first and second quarter of 1915. The asking price on No. 2X foundry for such deliveries is $13 to $13.25. Prompt delivery iron, of the remaining available tonnage may be obtained at $12.50 for the lower grades and up to $13.50 for the higher silicon irons.

The American Radiator Co.'s placement amounted to 108,000 tons. Of this amount 70,000 tons will go to the three plants of the company at Buffalo and the remaining 32,000 tons to Bayonne, N. J., and other points where the company has its plants. The other 42,000 tons booked by the furnaces here is for eastern users, largely.

Furnace interests here say that the heavy sales have practically absorbed the available tonnage of the stacks of the district now in operation up to the end of the first quarter of 1915. It was the intention of the Wickwire Steel Co. to take out of blast for an indefinite period its remaining stack here, but with this company's share of the heavy sales, the furnace will continue in operation.

There appears to be a demand for iron previously contracted. The shipping continues in good volume and one of the large producers of the district reports that on one day of the past week it sent forward the largest tonnage of pig iron ever shipped in a single day in the history of the company's business.

Quotations for first and second quarter delivery, f. o. b. furnaces, show: No. 1 foundry at $13.25 to $13.50; No. 2X foundry, at $13 to $13.25; No. 2 plain, No. 3 foundry, gray forge and malleable at $13, flat, and basic at $13.25 to $13.75.

#### New Life in Iron Market

Chicago, Nov. 24.—Apparently the turn in the pig iron market has come. A flood of inquiry for first quarter, first half and even for second quarter alone is being received from all directions by all sellers of both northern and southern iron.

Apparently the big users have covered their requirements for first quarter and even for first half and users of less tonnage, from 3,000 tons downward, are getting into the market actively in order to cover their needs before the expected advance becomes a reality. With such consumers as the American Steel Foundries, American Radiator Co., the International Harvester Co. and others taking advantage of present low prices and furnishing furnaces with a backlog, it becomes apparent to other buyers they must hurry or they may be caught on an advancing market.

Inquiry is being received so fast in this market that it is not possible to make an estimate of the total tonnage involved, but conservative makers state that if any considerable portion of the present inquiry is translated into orders, it will mean a decided advance in prices in a short time.

As the matter stands today, inquirers are being quoted $13.50, Chicago furnace, for No. 2 foundry and malleable, for immediate acceptance, to cover delivery during first quarter. To those who inquire for second quarter without first quarter business being included, makers are replying that they would rather not quote for fear the figure might prove irritating to the buyer.

As a matter of fact, furnacemen believe second quarter business is likely to bring at least $2 per ton higher than present quotations for immediate delivery. Sellers in this market are

(*For complete prices see page* 1014.)

striving to keep a level keel and prevent the market being carried off its feet by the immense inquiry coming in.

The fact that a steel plant blast furnace has been blown out recently is a factor which has a tendency to strengthen prices, as the output of this concern has been competing with merchant stacks and has had a decided effect on prices for several weeks. Developments are expected to follow swiftly and just what results will follow the present activity is difficult to say. Indications are the buying movement is real and will result in an immense tonnage being placed on books of furnace companies. Undoubtedly the tonnage already sold the country over is larger than any one realizes, and it is believed some furnaces blown out during the past year will be relighted to take care of the business which seems imminent.

Information received here is that the furnaces in the Buffalo district are sold up through first quarter and have advanced prices approximately $1 over those prevailing last week.

The American Radiator Co. has closed for a tonnage in excess of 100,000 tons of northern iron to supply the requirements of its eastern and northern plants through several months of next year. The announcement is made that this iron was bought at the prevailing market and the greater part will be furnished by Buffalo furnaces. In addition to what will come from this source this company has taken about 3,500 tons of southern Ohio foundry iron for one of its Ohio plants, which was bought at a figure considerably below the prevailing quotation for iron from Ironton. A small tonnage of Tennessee iron is also included in the Radiator company's purchase, and this also is believed to have been taken at considerably under the prevailing quotation.

Southern iron joins in the activity, and a large inquiry is being received, accompanied by considerable selling, to competitive points. So far, no considerable tonnage has been sold for delivery in Chicago or its immediate vicinity.

### Improvement at Cleveland

Cleveland, Nov. 24.—The pig iron market in the Cleveland district shows improvement owing to a moderate increase in melt and considerable more buying, but interest during the past few days has centered in the transactions of Cleveland firms at somewhat distant points. Although definite information is lacking, it is understood that a large part of the tonnage placed at Buffalo will come from furnaces represented in Cleveland. Sellers in Cleveland report that the strength of the present situation is shown not by large tonnages taken by a few melters but by a steady run of orders of from 300 to 500 tons each. One seller has averaged about ten sales per day of such tonnages for the past ten days. When pig iron was being sold at such a low figure in Buffalo that it could have been shipped to Cleveland and the freight paid at a lower price than was actutally being paid at Cleveland furnaces, buying in this city was almost at a standstill, but it is expected that the improvement recently noted will continue since the Buffalo situation has been greatly improved from a seller's standpoint.

### Buys 12,500 Tons of Basic

Pittsburgh, Nov. 24.—The American Steel Foundries has closed negotiations for approximately 12,500 tons of basic pig iron, on the basis of $12.50, valley furnace. While no official announcement has been made, it is understood the tonnage will be shipped to plants at Alliance, O., and Sharon, Pa., the first half of the year. Five thousand tons will be supplied by a prominent valley interest; it is not definitely known from whom the remainder of the tonnage was obtained. Culmination of this transaction indicates the position of the basic market, about which some question had been raised. While other grades are quiet, there is considerable improvement to the tone of the market. Several consumers of steel making iron have opened tentative negotiations and the market for foundry grades shows more life. Quotations are unchanged in position.

### Interest Spreads at Philadelphia

Philadelphia, Nov. 23.—Interest of consumers in their requirements of pig iron for first quarter and first half has continued to spread in this territory and sellers now report more inquiry than has been current in several months. At least 12,000 to 15,000 tons, largely foundry and forge, are under negotiation. Sales also have continued in better volume. Among the new inquiries to be put out are 4,000 tons of foundry and Bessemer for first quarter for the Norfolk & Western railroad, delivery at Roanoke; 500 tons for the Baltimore & Ohio railroad, and numerous small lots. A Lansdale, Pa., shop continues to figure on about 2,000 tons of low grade iron, and a Baltimore soil pipe maker for 1,000 to 2,000 tons. The Pennsylvania railroad still is in the market for a small amount of No. 2X and specialties. A Philadelphia buyer of malleable asks his December requirements. Sales of the week include 2,000 tons of southern forge and No. 3 to a Delaware river pipe maker on the basis of $10 for No. 2; 1,000 tons, half No. 2X and half ballast iron to a Philadelphia ship builder; 500 tons of malleable to a nearby consumer, which went to Buffalo at $14.45, delivered, or $12, furnace; and moderate lots to buyers at Reading, Williamsport and other points. Prices are no firmer, but $14.25, Philadelphia, for No. 2X continues to represent the competitive market on eastern Pennsylvania brands. Central Pennsylvania iron has been selling considerably below $13, furnace, for prompt. Buffalo competition no longer is felt so keenly in this territory owing to two of these makers having advanced their schedules 75 cents to $1.25 a ton. Virginia is unchanged at $12.50, furnace, with the likelihood of $12.25 for prompt still being available. In steel making iron, quotations on a small lot of basic indicate that on a sizeable tonnage of this grade $13.50, delivered eastern Pennsylvania, could be done. This is 50 cents under the last previous sale some weeks ago. Since that time the market has been nominal. A Chester, Pa., buyer has closed with a nearby maker for some standard low phosphorus at $19.50, delivered. Quotations on this grade cover the wide range of $19 to $20.50, Philadelphia. The Thomas Iron Co., which put in its second furnace recently, may put in another stack around Jan. 1.

### Conditions Improving

Cincinnati, Nov. 24.—Pig iron sales have increased about 50 per cent and the feeling in the market is much more optimistic. General inquiries are being received from all parts of this territory, the majority of which call for deliveries through the first quarter or first half. Numerous small lots are still being sold for immediate delivery, but the encouraging feature in the market comes from the comparatively large inquiries that are coming from localities where local dealers have a good chance of securing them. Local inquiries are also good. The Modern Foundry Co., this city, is out for 1,500 tons of foundry iron and the Monitor Stove & Range Co., a local melter, is also inquiring for the same amount. The Lunkenheimer Co. wants 300 tons of foundry iron and J. A. Fay & Egan Co. is asking for prices on about 500 tons of foundry iron. The Southern Railway, with offices in this city, has an inquiry out for a small tonnage. Other inquiries in this district include 500 tons of northern and 500 tons of south-

(*For complete prices see page* 1014.)

ern foundry iron from one melter in central Ohio, 1,000 tons of northern iron from a Michigan manufacturer and 600 tons of northern foundry and 400 tons of charcoal iron from a northern Indiana user. A north central Indiana melter is also inquiring for 3,000 tons of foundry iron. Recent sales include two lots of 1,000 tons each of northern foundry grades to two central Ohio melters and 1,200 tons of northern foundry iron to a northern Ohio manufacturer. Prices are unchanged at $10, Birmingham basis, for southern No. 2 foundry, and $13, Ironton basis, for southern Ohio No. 2 foundry, for prompt or first half shipment.

### Quiet at Birmingham

Birmingham, Ala., Nov. 22.—No improvement is expected by southern iron interests before the new year, at most. December is an off month. Inquiry for the first quarter in this district has brought out two quotations, one for $10, as announced last week, and another for $10.25. Second quarter 1915 delivery is being quoted $10.50. There is no change in the market for spot the rest of the fourth quarter of 1914. Small orders are being filled, apparently for immediate needs of buyers.

The rail mill of the Tennessee company is operating this week on full turn, the object being to give the men holiday money. It is reported a couple more furnaces will blow out during the week.

### Low Prices Withdrawn

New York, Nov. 24.—Heavy sales of iron by Buffalo furnaces in recent weeks now have produced the expected effect of a withdrawal by these makers of the low prices at which this business was taken. During the past few days certain of the Buffalo producers individually have been advancing their schedules until at the present time the market in that district, apparently ranges from $12.50 to $13.50, furnace, covering all grades and deliveries up to July 1. This change represents an average advance of at least $1 a ton, since during the selling movement $11.90, furnace, was done and lower is reported. Now that the recent drive for orders by Buffalo makers practically is over, a clearer impression of the extent of these activities is possible and the estimate is made in well-informed circles that not less than 150,000 tons, probably more, have been booked by these makers, most of it quietly, during the past four weeks in various eastern territories, but principally in New York state, New England and in eastern Pennsylvania. The large proportion of this business has been in foundry and forge irons, but some malleable and basic were included. With the higher prices now quoted, Buffalo iron is moving less vigorously, but the market remains fairly active, as consumers generally are more awake to the advantages of the present market. Known sales of the week include 3,000 tons of two foundry grades for the Essex Foundry Co., Newark, N. J., for the first four months of next year, which was divided between an eastern Pennsylvania and a Buffalo maker; 2,500 tons to the Central Foundry Co. for Newark delivery, taken by Buffalo; 2,000 tons for the Walworth Mfg. Co., Boston; about 2,000 tons by an Ansonia, Conn., consumer; 1,500 to 2,000 tons for a Hartford shop; about 1,000 tons to a Paterson, N. J., buyer; 500 tons to a Newark hoisting machinery manufacturer and numerous others. Buffalo iron, figured wholly as largely in all these transactions. A Chrome, N. J., steel maker bought 300 tons of prompt basic at $13.30, delivered, from an eastern Pennsylvania furnace, and also a small lot of low phosphorus. Lebanon low phosphorus has been more active and one sale of 500 tons is reported. Some eastern Pennsylvania makers have been meeting the low Buffalo figures at tidewater, equivalent to $13.75 to $14. The Buffalo advance now is expected to bring about some stiffening of these figures.

### Small Rates at St. Louis

St. Louis, Nov. 23.—Sales of pig iron in this market last week were limited to one order for 400 tons of Southern No. 2, one for 300 tons of Southern No. 2, and one for 400 tons of the same grade, and few scattering lots. A new inquiry for 400 tons of Southern No. 2 for delivery over the second and third quarters of next year was received this morning, and those for 1,000 tons and 1,200 tons of the same grade reported last week have not been closed or withdrawn. Southern No. 2 is quoted at $10 to $10.25, Birmingham basis; Northern at $13 to $13.50, Chicago furnaces, and $13, Ironton.

## Tin Plate Prices Uncertain

Pittsburgh, Nov. 24.—Manufacturers of tin plate have not yet opened books for 1915 shipment, although some material has been sold for delivery after Dec. 31 on contracts based upon the quotation announced when buying for 1914 began. These contracts, of course, are subject to change. Generally speaking, makers are asking $3.25 for prompt delivery, although expressions are heard that that figure still can be shaded $1 or $2 a ton, if attractive tonnages are involved.

(*For complete prices see page* 1014.)

## Billet Inquiry

### Still Being Received From Europe—The Latest Figures

Philadelphia, Nov. 23.—A new inquiry for 3,000 to 6,000 tons of billets and slabs for export to Europe has been put before the mills by a merchant in this district. Considerable figuring on semi-finished steel for export principally to the British Isles continues and as prices now have reached a very low point, the outlook for orders is better. Makers in some cases have quoted sheet bars at slightly below $20, eastern seaboard. Billet prices in the same lot were a little higher than those for sheet bars. A requirement of 2,000 tons of billets and sheet bars for Glasgow, recently bid upon, remains pending. The domestic market on billets in this territory is inactive. A Richmond, Va., buyer placed 1,200 tons of 2-inch billets with a maker in the Pittsburgh district and is reported to have obtained a price around $18.50, Pittsburgh. Eastern Pennsylvania makers have continued to quote rolling billets at $19, Pittsburgh, or $21.40, Philadelphia.

### Semi-Finished Weak

Pittsburgh, Nov. 24.—The market for semi-finished steel products in western Pennsylvania and eastern Ohio continues weak, although some makers express the opinion that conditions have improved moderately the last fortnight. Billets are obtainable at $19, mill, and sheet bars are not commanding much above that figure, for delivery the remainder of this year. Specifications against contracts for billets show more snap than previously. Forging billets are commanding $5 a ton above the market for rolling billets. Wire rods, nominally quoted at $26, Pittsburgh, probably could be obtained at $25.

## Pipe Market Quiet

Pittsburgh, Nov. 24.—The market for tubular goods in the Greater Pittsburgh district continues to border on stagnation. No attractive inquiries are before the trade and no orders of importance have been placed, so far as can be ascertained. Prices are being satisfactorily maintained, manufacturers report. Boiler tubes continue quiet.

The Universal Machinery Co., 1916 St. Paul avenue, Milwaukee, manufacturing gasoline motors, trucks and special machinery of all kinds, has filed a voluntary petition in bankruptcy. Liabilities are scheduled at $59,957 and assets at $68,352.

# Italy Wanting Sheets

## And is Investigating as to Possibility of Buying in This Country—Prices Still Being Cut

Philadelphia, Nov. 23.—A representative of Italian manufacturers of motor cars and of electrical equipment called upon eastern Pennsylvania makers of sheets, the past week, and inquired as to their facilities for furnishing large quantities of electrical sheets and other products which these consumers formerly had drawn from Germany and Belgium. As eastern Pennsylvania sheet makers are not producers of electrical sheets, the buyer has been referred to Pittsburgh district mills. The sheet market in this territory remains very quiet and bookings are exceedingly poor. The falling off of business with eastern Pennsylvania sheet makers during the past several weeks has been pronounced. Prices in this district are weak. On No. 10 gage blue annealed 1.50c, Philadelphia, or 1.35c, Pittsburgh, is appearing rather freely and, as previously reported, some attractive business has gone $2 lower.

### Sheet Prices Lower

Pittsburgh, Nov. 24.—Interest in the market for steel sheets has been more general the last few days. Specifications against contracts and new inquiries have increased in number, but not much tonnage, even in the aggregate, is involved. What little selling has been enjoyed has been at the expense of prices; both black and blue annealed sheets have declined $1 a ton, and reports of even lower prices are heard in adjoining districts. Plant operations continue at low ebb.

### Newport Mill Reopens

Cincinnati, Nov. 23.—The plants of the Andrews Steel Co. and the Newport Rolling Mill Co., both in Newport, Ky., and which are operated in conjunction with each other, will re-open on Nov. 30, after a shut down of two weeks for repairs. Other rolling mills in this territory are running at from 60 to 90 per cent of capacities. The sheet market is fluctuating, orders being good one day and poor the next. It is generally believed by the trade here that rock bottom has been reached in prices and that the next change will be an advance. Buyers are beginning to show an interest in purchasing for the first quarter and mills are asking an advance of $1 per ton for this delivery over prompt shipment prices. Quotations for prompt delivery are 2.058c for black sheets, No. 28 gage, and 3.058c for galvanized, No. 28 gage, both Cincinnati basis.

### Some Shading at Chicago

Chicago, Nov. 24.—Considerable interest attaches to the steel sheet market at present, as some makers apparently are anxious to obtain tonnage regardless of prices. While some interests in this territory are attempting to hold firmly at 2.09c for No. 28 gage black and 3.04c, Chicago, for No. 28 gage galvanized, buyers assert they are receiving bids as low as 2.94c, Chicago mill, for galvanized and in some instances business is said to have been booked a shade lower than the latter quotation. As a rule, the business offering is for small tonnage and the larger makers are not willing to quote below the prices mentioned above. Sheet mills are running only part time.

# Plate Orders Improve

## In Some Sections, But Buying is Not General and Prices Are Low

Philadelphia, Nov. 23.—Plate makers at Coatesville have been entering orders of a mixed character somewhat more freely and several additional open-hearth furnaces have been put on. Some of this business has been for stock. The actual improvement in orders, however, has not been generally felt by all eastern mills and the lack of railroad buying continues to hold the market to greatly reduced proportions. At the same time, sentiment among buyers appears to be making progress and some of the most important consumers in this territory are more inclined to make contracts well into the future at the present market. The makers, however, are loath to do this and endeavor not to extend 1.25c, Philadelphia, or 1.10c, Pittsburgh, beyond Jan. 1. One maker reports having refused some highly attractive business offered to it at concessions. The government is asking 1,200 tons of plates and a small quantity of shapes and bars for Panama, bids to be received Dec. 7.

A boat order requiring 3,000 tons of plates is on the verge of being closed with eastern ship yards. An inquiry for 200 tons of plates to cover export orders has been put out by a shovel manufacturer in this territory.

### Boat Steel is Pending

New York, Nov. 24.—Another good-sized boat other than the tanker for the Standard Oil Co. previously referred to, is being figured on in this district and is expected to be closed in the near future. The steel requirements will run 3,000 to 4,000 tons. Bids will be taken by the government on Dec. 15 on eight submarines requiring 1,000 to 2,000 tons of steel. Plate orders in this district still run small, but are a little better in volume. The market continues to be quoted at 1.26c, New York, or 1.10c, Pittsburgh, but on small sales a higher figure sometimes is obtained.

### Small Demand at Chicago

Chicago, Nov. 24.—Conditions in the steel plate market remain the same and in the absence of car orders the demand for plates is unusually slack. Most mills making this form of finished steel are operating only a portion of each week and no considerable tonnage is being taken by any producer. Prices continue to scrape bottom at 1.25c to 1.34c, Chicago mill.

### Would Like to Contract

Cleveland, Nov. 24.—The finished material market in Cleveland on the whole, shows considerable more activity. Reports from different offices vary somewhat, but most of them are to the effect that specifications are heavier and inquiries much more numerous. The weak feature of the situation is prices, which are very low, but buyers are showing a disposition to contract for plates, shapes and bars as far into the future as possible and are finding the mills very conservative in regard to taking on tonnages at present quotations.

### Shading at Pittsburgh

Pittsburgh, Nov. 24.—Irregularity characterizes the market for hot rolled products in the Greater Pittsburgh district. As previously reported, mills in adjacent territory have been disregarding the Pittsburgh basing price for some time, making it difficult to meet outside competition. While plates, shapes and bars generally are held at 1.10c, plates are obtainable at 1.05c

(*For complete prices see page* 1014.)

for immediate shipment, and some uncertainty is expressed about the strength of bars and shapes. Specifications against contracts have been light; last week was the quietest six-day period experienced by some mills in many years. Plants are operating at less than 40 per cent of capacity. The Carnegie Steel Co. and the Jones & Laughlin Steel Co. are each rolling 10,000 tons of rounds for the manufacture of shrapnel, the orders for which were mentioned by The Iron Trade Review, Nov. 19.

# English Are Cautious

## About Allowing Ferro-Manganese to be Imported, But Supply Will Probably be Ample

New York, Nov. 24.—Despite conflicting reports as to how far the English government will extend license for the exportation of ferro-manganese at the present time, the fact remains that some regular sellers continue to offer at $68, seaboard, additional material to arrive during the remainder of the present year or over the first quarter. A number of small sales for such delivery have been closed at this price. These have not been large, as they have been made with the smaller class of consumers and, in the aggregate, the week's bookings of this kind did not exceed 1,000 tons. There continues a little more stir in the market, especially among the smaller users who appear to be in a less fortunate position on stocks than the larger buyers. Large steel makers state that at the present rate of operations, they have sufficient ferro-manganese on hand to meet their requirements for fully a year.

Private advices from England to some sellers show the belief in well-informed circles there that arrangements can be made, if not now, at a later date, to have granted by the government, license to ship ferro-manganese for the legitimate needs of consumers in this territory, provided assurances are given of the proper destination of the material. Circumstances have shown, however, that up to this time the English government has been cautious in establishing a formal precedent of this kind and that careful discrimination is being exercised in allowing material to be exported to this country. One seller has been enabled to ship some tonnage which was on dock or loading at the time the embargo was enforced. A merchant, however, in the week, was refused license to ship, notwithstanding he offered to give every formal assurance required as to the final purchaser. Some merchants still hold their offerings of ferro-manganese at $75, seaboard.

It is reported that the eastern Pennsylvania steel makers have been quoted English 20 per cent spiegeleisen at $27, seaboard, which is below the market for the domestic product. The 200-ton inquiry for a Philadelphia steel maker still is pending. Some good-sized inquiries for ferro-silicon have been put out in the eastern market.

### Agreement Expected

Washington, Nov. 24.—The belief grows here that some amicable arrangement will be reached with England looking to the lifting of the embargo on manganese ore and ferro-manganese. The State Department has been advised that the British government has, through the proper departments, taken up the question with indications that an early reply will be received. It is the opinion here that England will remove the embargo with a guarantee by importers in this country, perhaps to be secured by bond, that re-exported material will not reach countries hostile to the allies. Additional hope in this direction was given last week with the receipt by the State Department of a cable from the American consul at Bombay, India, that two cargoes of manganese ore held there had been released and allowed to proceed to this country. The conditions of the release were not stated in the dispatch.

### Ferro Again Marks Time

Pittsburgh, Nov. 24.—The market for ferro-manganese in western Pennsylvania and eastern Ohio again is marking time. A couple of carload lots of this material have been sold within the last 10 days at $68, seaboard, for prompt delivery, and consumers do not appear alarmed over the future. Other alloys continue quiet, but unchanged in position.

# Coke is More Active

## Effect of Large Sales of Pig Iron Shown in Furnace Inquiries for Long Periods

Pittsburgh, Nov. 24.—Rather heavy demand for pig iron in adjoining territories has had a beneficial influence upon the market for blast furnace coke. Buffalo blast furnace interests, which have been playing an active part in the pig iron market, have opened negotiations for blast furnace fuel. The Buffalo Union Furnace Co. is asking bids on about 10,000 tons a month for shipment over two years, and, according to some expressions, the contract for the tonnage involved, based upon a sliding scale, already has been placed. The Wickwire Steel Co. is expected to close shortly on an inquiry for 48-hour coke for extended delivery, and a prominent central western concern is in the market for 12,000 tons a month for delivery the first and second quarter of 1915.

### Foundry Coke Slow

Cincinnati, Nov. 24.—The foundry coke market is very quiet. Fully 90 per cent of the foundries in this territory have contracts covering their requirements for several months and the other ten per cent are buying in small lots from time to time as fuel is actually needed. A sale of 50,000 tons of by-product furnace coke has been made to a southern Ohio furnace. This and the sale of 35,000 tons of Pocahontas furnace coke to another southern Ohio furnace about two weeks ago, comprises the only two important coke transactions in this territory for four or five months. Prices are unchanged but show a slight tendency to become stronger.

### Covers First Half Coke

Philadelphia, Nov. 23.—A Lehigh valley furnace has contracted for about 20,000 tons of Connellsville 48-hour coke for shipment over the first half. The price is understood to have been about $1.75, ovens. This is the minimum figure at which several important producers are holding. There is but small interest at this time among eastern furnace interests in their requirements of forward coke. Spot coke also is in light demand.

The Norfolk & Western railroad is inquiring for its first half requirements of foundry coke.

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The Sharon Hoop Co., Sharon, Pa., plans to rebuild the hospital at its works.

(*For complete prices see page* 1014.)

# Better Tone in Scrap

## In Eastern Pennsylvania—Panama Material Will Probably be Sold at Low Figure

Philadelphia, Nov. 23.—In one or two cases, better orders have caused eastern Pennsylvania consumers of old material to give more attention to the market; in others the very low prices have stimulated more interest though the material will go into stock; underlying the whole situation, a better tone is discernible and some grades are firmer. Heavy melting steel of first class quality is commanding $9.50, delivered, and some important buyers will offer that figure. One eastern steel maker obtained some tonnage of steel at $9.25, delivered, but the specifications of this particular works are quite liberal. Another mill is buying turnings, borings and stove plate. Re-rolling rails have been offered at $11, delivered, without takers. Malleable is lower. Some brokers are paying good prices for shafting, which is scarce. The 7,000-ton block of Panama scrap, including 4,000 tons of steel rails, which recently was brought to this part, now is being offered in bulk, and if it is sold it probably will be at a low figure. The Chicago Housewrecking Co., the owner of the scrap, is offering it. Merchants say that a good opportunity for exporting scrap to Europe now exists, were anything like normal freight rates obtainable, but such quotations as 30s from eastern seaboard to Mediterranean ports effectually shuts off such business.

### Scrap Still Low

Pittsburgh, Nov. 24.—Despite low quotations, consumers of iron and steel scrap are not attempting to cover future needs. Scarcely enough tonnage has been sold this week to test the market, and prices are considered nominal. Middlemen feel confident, however, that improvement will be noted as soon as finishing mills become more active. Consumers' stocks are decidedly low, and much of the stock held by jobbers will not be released until prices have advanced $1 or more a ton.

### Market Still Dull

Cincinnati, Nov. 23.—The slight demand for No. 1 cast, which has resulted from foundries receiving numerous orders for castings for machine tools, has been more than counterbalanced by the large stocks in dealers' yards and the surplus scattered throughout the country, especially in the rural districts. A large amount of cast borings and steel turnings is being thrown upon the market from machine tool manufacturing plants which are running full force with occasional night shifts. Sales are being made mostly to melters outside of the city, as local users are either well supplied, or are buying from hand to mouth. Prices show no change, but are very uncertain because of the lack of sufficient transactions to test them.

### Slow and Weak

Chicago, Nov. 24.—Conditions in the scrap market at Chicago are unchanged, with almost no business being done and prices resting at former quotations. Steel mills are taking no tonnage, as operations are intermittent and, aside from an occasional sale, business is at a standstill. Railroads are offering comparatively large lists this week, which will have a tendency to hold prices at least as low as at present. Among the railroad offerings, the Rock Island is out with a list of 7,200 tons, including 100 tons of long steel rails, 600 tons No. 1 wrought and 400 tons No. 2 wrought. The Northern Pacific is offering 4,000 tons, the Chicago, Great Western 750 tons, Michigan Central 2,800 tons and the Grand Trunk 1,300 tons.

### Dealers are Busier

Cleveland, Nov. 25.—Improvement in sentiment generally, and increased activity in the pig iron market in particular have given more backbone to the market for iron and steel scrap in this district. Dealers are again trading more actively among themselves, sellers being less inclined to sell at the recent prevailing low levels. Heavy melting steel scrap has advanced 25 cents a ton, now being quotable at $9 to $9.50. Mill buying continues at a minimum, most plants in the district refusing to accept shipments. So it may be said the whole movement is sentimental. However, dealers are busy covering shortages and seem agreed that the market has seen bottom and a gradual advance in prices is at hand.

### Buffalo Market Improves

Buffalo, Nov. 22.—The old material dealers of the Buffalo district report an improvement in tone and are confident that better prices will be obtainable in a short time. The large amount of buying of pig iron and the consequent advance of prices have had a tendency to stiffen the prices of the various scrap lines. Dealers are loathe to book much business at present schedules. In heavy melting steel, offers have been made for material to be shipped over first quarter of 1915 at $10 per gross ton, f. o. b. Buffalo, but little has been closed at this figure.

(*For complete prices see page* 1014.)

### Little Trade at New York

New York, Nov. 24.—Business with scrap brokers and dealers in this territory has remained slow. The low market at principal consuming points in eastern Pennsylvania offers small opportunity for shipping material from this district. Very few new orders now are being taken and attention mainly is being given to filling old contracts at higher figures. The opinion still prevails in some quarters, however, that the prospects of the market are better. No sales of importance of heavy melting steel have been made here, but it is learned that one eastern Pennsylvania works took 1,000 tons from a Philadelphia dealer at $9.25, delivered, under specifications which are less rigid than ordinarily. Offers are outstanding by eastern Pennsylvania consumers of $13.50, delivered, for shafting, and $8.50, delivered, for stove plates.

### No Lists

St. Louis, Nov. 23.—There are no scrap lists out today, and no business in sight. Dealers are not looking for any improvement in the market in the near future. Nearly all prices on scrap have declined since last week.

## Wire Prices Irregular

Pittsburgh, Nov. 24.—Developments the last few days have indicated that the market for wire products is not so strong as represented by published quotations. While leading makers are asking $1.60 for nails, that figure is being shaded about $1 a ton, and nails appear quotable at a spread from $1.55 to $1.60. Wire is fairly steady on the basis of $1.40, although some consumers have been able to extend old contracts at $1 a ton under the generally quoted market. Demand for barbed wire for foreign shipment continues heavy, and most mills will operate wire mills practically at full capacity through the remainder of the year.

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The Security Steel & Iron Co., dealer in scrap iron and steel at Green Island, N. Y., has filed a petition in bankruptcy with liabilities of $173,483 and assets of $2,541. Harry E. Clinton, president of the company, signed the petition under which all suits against the bankrupt have been restrained.

## Steel Bars

### Sold at Low Prices—Demand Shows Some Improvement

Cleveland, Nov. 24.—The selling of steel bars in the Cleveland district has been characterized by very low prices within the past few days. As low as 1.05c, Pittsburgh, has been done in exceptional cases for immediate delivery. In competition with re-rolled steel bars, reinforcing bars of new steel have been quoted on a basis very little above 1 cent a pound, Pittsburgh. The demand for reinforcing bars has been rather slack recently. The demand for steel bars for manufacturing purposes is improving and a considerable tonnage is being inquired for. The leading interest is holding firmly to 1.10c, Pittsburgh.

### Steel Bars Are Quiet

Chicago, Nov. 24.—No increase of demand for steel bars is apparent and the market is simply drifting with insufficient tonnage to keep mills busy and with prices pegged at 1.25c, Chicago, for immediate local delivery and 1.29c to 1.34c, Chicago, on general business. Agricultural implement makers are taking some tonnage, but apparently are not operating as actively as usual, and are not as large a factor in the market as the season would indicate.

Some inquiry is being received for bars for delivery during first quarter and quotations for this delivery as a rule are 1.34c, Chicago mill, and for first half 1.39c is being asked. One local interest is willing to take on some tonnage beyond Jan. 1 at 1.29c, Chicago mill. The inquiry seems to be more or less tentative and up to this time has not resulted in any considerable tonnage being booked.

### Specifications Grow Slightly

Philadelphia, Nov. 23.—Some large steel bar makers now report that manufacturing consumers in this district are specifying a little better against their contracts, entailing a small increase in total mill orders. The jobbers however are not doing much with their contracts. New business is light and practically no contracts are being taken, as makers are not much inclined to push them at the low market. On desirable business, the going price remains 1.25c, Philadelphia, or 1.10c, Pittsburgh.

### Buyers Are More Interested

New York, Nov. 24.—A little more attention has been given by buyers to the steel bar market, but reports from Pittsburgh of lower prices have had the tendency of causing some of them to hold off temporarily. The bar market in this territory, however, has not been subject to the further weakness noted in some other territory and no cases where less than 1.10c, Pittsburgh, has been quoted, have been uncovered. Makers appear to be holding to 1.26c, New York, or 1.10c, Pittsburgh, as minimum.

### Iron Bars Steady

Chicago, Nov. 24.—Operations of iron bar mills in the Chicago district continue on the same basis as in recent weeks, the leading interest keeping its mill running practically full and others working about half time. No increase in demand is noticed and prices remain at the same level, quotations being 0.95c to 1.05c, Chicago mill.

### Moderate Improvement

Buffalo, Nov. 22.—The mills and agencies of the Buffalo district report that inquiry seems to be a little better than was felt a week ago, with some consumers coming into the market with negotiations for contracts covering requirements into first quarter at least of 1915. Specifications and orders in some instances have been lighter than a week ago with some of the interests, but other offices report an improvement over a week ago in bars, shapes and plates. The prices are unchanged, 1.10c, base, being asked for carload lots on immediate shipment orders, and 1.15c, base, for less carload lots. Some agencies are holding to the price of 1.15c, base, on all booking.

### Hoops, Bands and Shafting

Pittsburgh, Nov. 24.—There is no snap to the market for hoops, bands or shafting. Specifications are light and no new orders of importance are being placed. Quotations are unchanged.

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## Fair Warehouse Business

Chicago, Nov. 23.—Warehouse business continues on about the same scale as has ruled for most of the autumn. Prices are unchanged and demand, while less than usual at this season of the year, is fairly steady, and in places gives signs of increasing with a somewhat easier money market.

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The Gary Screw & Bolt Co. has moved its general offices to its plant at Gary, Ind., from the Continental & Commercial National Bank building, Chicago.

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Oliver William Greenslade, president and general manager of the Greenslade Foundry Co., Milwaukee, died on Nov. 13 of heart failure.

(*For complete prices see page* 1014.)

## Cast Pipe

### Outlook Shows Improvement—Private Buying Active

New York, Nov. 24.—Municipalities continue to put out an increased volume of inquiries for their needs of cast iron pipe, and the outlook of trade in this line is improved considerably. Dayton, O., has asked for bids Dec. 3 on 5,500 tons of 3 to 6-inch; New Bedford, Mass., for Dec. 3 on 1,000 tons of 4 to 30's; Lynn, Mass., is taking bids this week on 1,500 tons of 4 to 30's, largely of the latter size, while Athol, Mass., is asking for 1,200 to 1,500 tons of 12 to 16's. Eastern foundries are bidding on the 25,000 tons of 6 to 48's for Detroit, closing today. Low prices are expected. The 3,900 tons of 60's for Boston closed yesterday. Abner Harper & Bro. have the general contract for 680 tons of 4 to 10's for Woppingers Falls, N. Y. Private buying of pipe is good, some shops reporting it to be better than normal for this time of the year. The low prices at which the shops have been accepting business apparently have stimulated this demand. These low prices still obtain, but a continuation of the present inquiry is expected soon to result into a firmer situation.

### No Improvement

Chicago, Nov. 24.—Cast iron pipe makers are still hard pressed to obtain sufficient tonnage to insure economical operations of their foundries. Such business as is being received is for small tonnages and for sizes which do not allow full operation. The Lynchburg Foundry Co. has taken 300 tons for Springfield, O., which is about the only project uncovered during the past week. Bids were opened at Pueblo, Colo., Nov. 20, for 500 tons, but the award has not yet been made. Neoga, Ill., will open bids Dec. 4 for 153 tons.

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## New Mansfield Sheet Mill

The new sheet mill at Mansfield, O., is nearing completion and part of the mill may be in operation by Dec. 15. The mill will have six stands of rolls.

The plant is located between the B. & O. and Pennsylvania railroads and only a short distance from the Erie.

William H. Davey, general manager of the new plant, for the past five years, has been in the same capacity with The Massillon Rolling Mill Co., Massillon, O. He also has been associated with the Carnahan and Berger plants in Canton. Associated with him are his seven brothers, all formerly with the Massillon company.

# All to Lackawanna

## New York Central Places Rail Order—Inquiry for 500,000 Steel Sleepers for Export—Greece Needs Rails

New York, Nov. 25.—The New York Central railroad, which recently inquired for 25,000 tons of rails for the lines east, as a part of its 1915 requirements, has placed this order with the Lackawanna Steel Co. Part of these rails will be rolled this year. The same system also is expected to put out inquiries soon for a larger tonnage for its western lines. Other railroads are giving more attention to their 1915 rails, but it is not likely that much placing will result until the pending decision on their petition for an advance in freight rates is rendered.

An inquiry for 500,000 steel sleepers or steel ties for export, is before American steel makers. It is understood this order is for Greece, which previously has been satisfying its requirements in this line with German and other European mills. These sleepers are of special design and of plate construction. Each weighs about 140 pounds. The total quantity of plates involved, accordingly, is about 35,000 tons. Their manufacture is by the die and press method. A western Pennsylvania mill, which is actively working on the business, is expected to receive a considerable portion of the order. Greece, which also recently was in the market for 5,000 tons of rails, is reported to have placed this order with an eastern Pennsylvania mill. Bids upon the inquiry for 30,000 tons of rails for the Norwegian State railways are due Dec. 7. The inquiries for 20 and 67-pound rails for Russia still are pending.

France, which recently placed orders for 20 narrow gage locomotives with the Baldwin Locomotive Works, as reported, still is figuring for additional motive power, the same as Russia. A report that Russia has given the Lima Locomotive Corporation 30 locomotives in addition to an equal number placed with the Baldwin Works, is without foundation. Nothing has been heard of the recent inquiry of the Greek government, for 15 to 20 locomotives. Domestic roads continue to inquire better for locomotives, but are placing few. The car market remains very dull. The Baltimore & Ohio railroad is in the market for a contract covering its first half requirements of standard spikes, which usually runs 10,000 kegs or more.

### Sales of Rails

The National Steel Rail Co., St. Louis, Mo., dealer in rails, new and re-laying, has sold 1,500 tons of steel rails to the Vicksburg, Alexandria & Southern railroad, of Louisiana; 3,000 tons to ex-Governor Haskell of Oklahoma, who is building the Oil Belt Terminal railroad, 2,500 tons to an Interurban railroad in western Kansas and 2,800 tons for export shipment to South America. These sales were made by the manager I. H. Cohn. The company has been buying new spikes, track bolts, etc.

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# Higher Taxes

## On Mesabi and Vermilion Ores—Cuyuna Assessment

The Minnesota Tax Commission has completed the equalization of the assessment for 1914 of iron ore tonnages and mineral lands on the Mesabi, Vermilion and Cuyuna ranges. On the Mesabi and Vermilion ranges a raise of five per cent was ordered upon all mined and unmined iron ore and upon unplatted mineral lands in St. Louis county and 10 per cent on all unplatted lands in Itasca county. This total tonnage of merchantable ore in the Mesabi and Vermilion ranges amounts to 1,407,218,914 which includes 9,308,432 tons in stock pile on May 1, 1914. The assessed valuation of the total tonnage and the mineral lands amounts to $270,603,874. The Tax Commission is of the opinion that the iron ores of the Mesabi and Vermilion ranges are now on a basis of 50 per cent of true and full value.

Iron tonnages of the Cuyuna range, having been during the year measured and calculated by the mining engineer of the Tax Commission, an ad valorem assessment of 50 per cent of the present indicated full value has been made. The assessment is placed upon 13 active mines, or those about to become mines, containing 30,356,975 tons; on 19 properties of reserve ore of the first class, containing 27,066,558 tons; on 5 properties of reserve ore of the second class (lower grade), containing 13,434,332 tons; of 35 properties, containing 13,907,949 tons of low grade, non-merchantable, or non-minable iron; and also manganiferous "ore material" arbitrary values amounting to a total of $65,250, and regarded as upon mineral lands. The total assessed valuation of the total merchantable iron ore of 71,085,440 tons, including 227,575 tons in stock pile, and the mineral lands, of the Cuyuna range, amounts to $6,033,085.

(*For complete prices see page* 1014.)

### Not Interested

New York, Nov. 24.—Efforts have been made without success by sellers to place a cargo of Newfoundland ore with eastern furnaces, but the latter, owing to their large stock piles and reduced operations, are indifferent to additional purchases, even where the mineral is offered at attractive prices. One large eastern steel company is understood at the present time to have approximately 400,000 tons of ore in stock, a large part of which is foreign ore. The single cargo of Swedish ore, comprising 5,500 tons, which has been afloat, has arrived at Philadelphia. Another cargo of Chilean ore for the Bethlehem Steel Co. also came in during the past week. Foreign ore arrivals remain light.

### Stops Exports

Washington, Nov. 24.—France has flatly refused to permit the exportation of chrome ore from New Caledonia a province of that country. This is the reply received by the State Department, which, on behalf of four American steel companies, has asked France if she would lift the embargo provided a guarantee was given that the material would not be re-exported to countries hostile to the allies.

In refusing the request made upon her, France said that she will need the whole supply from New Caledonia for the use of the armies and navies of the allies.

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# Takes Over Ore Mine

The Fort Montgomery Iron Corporation has been formed with a capital of $500,000 to succeed the Hudson Iron Co., which has been operating the Forest of Dean mines at Fort Montgomery, N. Y. The new company will conduct business along the same lines as the old. While the charter gives it full powers to engage in the manufacture of iron, it will at present confine itself to mining. Oswald Garrison Villard is president and C. M. Sanford secretary and treasurer. The offices of the company are at 20 Vesey street, New York City.

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Erdle Perforating Co., 7 Factory street, Rochester, N. Y., manufacturer of perforated metals, will move on Dec. 1 to larger quarters at 171 York street.

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Charles Willard Kettell, a retired mechanical engineer of Boston, died at his home in Lexington, Mass., Nov. 19, aged 65.

# Building Work

### Develops Very Slowly—Lettings Are Not Numerous

New York, Nov. 24.—Better sentiment, which continues more generally in evidence in the structural market, has brought little actual increase in new business in this territory. New inquiries both in mercantile and railroad work are very scant. Lettings of the past week have been few and of light tonnage. They have run principally to small requirements. There have been rumors in this market the past week of some round tonnages of bridge work about to be placed and one of these has been to the effect that a large western bridge previously thought awarded to an independent shop was to be re-offered for some cause. There is no confirmation of any of these reports, however. It is learned that some building work of good size is under negotiation quietly in this territory, and early action is awaited. The 15,000 tons Chesapeake & Ohio northern bridge over the Ohio, still is in prospect, but the directors have yet to take action on the steel. Sharp competition for both plain and fabricated material continues, bringing sometimes a shading by some makers of the 1.21c, New York, or 1.10c, Pittsburgh, price on shapes.

### Structural Market Dull

Pittsburgh, Nov. 24.—Despite improvement in sentiment, fabricators have experienced no change in the situation. No contracts of importance have been placed in this district, and no structural undertakings are under consideration. Fabricators are not buying structural material, notwithstanding low prices.

### Demand Not Improved

Cleveland, Nov. 24.—The demand for structural material in the Cleveland district shows no improvement, but numerous projects are being considered and it is expected that there will be a large amount of building when the weather permits.

### Are Dull at Chicago

Chicago, Nov. 24.—Business in structural shapes continues extremely dull and the revival of business expected when money conditions eased has not yet developed. Quotations are stationary at 1.25c to 1.34c, Chicago mill, with unusually small tonnages the rule. Three small contracts aggregating less than 400 tons represent the business in this territory for the past week.

### More Hope at Philadelphia

Philadelphia, Nov. 23.—Sellers of structural shapes in this territory are inclined to view the situation more hopefully owing to the improved sentiment in the market and the belief that this materially will improve prospects for later business. The past week has given evidence of the better feeling by some increase in the inquiry for small work. Even the small tonnages now making up new business, nevertheless, draw forth very vigorous competition both from the mills and fabricators. In some cases prices equivalent to less than 1.25c, Philadelphia, or between 1.05c and 1.10c, Pittsburgh, have been done on plain material for this class of orders. Shape mill operations in eastern Pennsylvania continue on a low ebb, some plants not doing more than 30 to 40 per cent of capacity. One mill which has accumulated considerable business at very low prices is doing better than this rate.

### Detroit Conditions

Detroit, Nov. 24.—Building operations in Detroit, Grand Rapids, Saginaw and the other principal cities of Michigan are at rather a low ebb as compared with a season ago but contractors and architects seem to be optimistic for spring work and are making preparations for a resumption of activities on rather a large scale. Permits for the past week totaled $254,275, far below the aggregate of the same period in 1913. There was also an appreciable falling off as compared with the previous week.

#### CONTRACTS PLACED.

High school No. 174, Washington, 200 tons, awarded Dietrich Bros.

Locks for the East river tunnels, New York City, 360 tons, awarded Coatesville Boiler Works, by the Flynn O'Rourke Co., Inc.

Extension plant Hess-Bright Mfg. Co., Philadelphia, 155 tons, awarded to Steele & Wike.

Bridge work for Pennsylvania railroad at Spring Creek and Angola, N. Y., 145 tons awarded to Riter-Conley Mfg. Co.

Minnesota Steel Co., breaker house for coke plant, New Duluth, Minn., to American Bridge Co., 115 tons.

Laclede Gas Light & Power Co., power house and coke oven plant, St. Louis, to Lackawanna Steel Co., 160 tons.

Minneapolis, St. Paul & Sault Ste. Marie Ry. Co. plate girder spans, to Chicago Bridge & Iron Works, 107 tons.

Railroad viaduct at Wilkesbarre, Pa., 400 tons; general contract awarded the C. M. Neeld Construction Co., Pittsburgh.

#### CONTRACTS PENDING.

Section No. 4 of the Broadway-Fourth avenue subway extensions, New York City, 4 860 tons, bids to be taken Dec. 11.

Section No. 9 of the Broadway-Fourth avenue subway extensions, New York City, 400 tons, bids to be taken Dec. 1.

Bridge work for Lehigh Valley railroad, 500 tons, bids being taken.

Cotton warehouse New Orleans, tonnage indefinite, bids being taken.

Bridge for barge canal, Watkins, N. Y., 200 tons, Oswego Construction Co., low bidder.

Lockport High School, Lockport, N. Y., 300 tons structural, bids thrown out, exceeded estimates, will revise plans and re-advertise soon.

Bridge, at Abbott Road, Buffalo, river improvement by city, 800 tons, plans completed, take bids soon.

Addition to the Willys-Overland plant, Toledo, 1,600 tons of shapes and 1,500 tons of reinforcing bars.

Rolling press dam for the United States reclamation service, in Colorado, 300 tons, Riter, Conley Mfg. Co., low bidder.

Bridge for Boston & Albany railroad, Boston, 200 tons, bids being taken.

(*For complete prices see page* 1014.)

# METAL MARKETS

## New York

Nov. 24.

The undertone in the metal markets continues firm and the tendency in prices continues upwards. Especially has this been the case in copper. Electrolytic now is held by the leading producers at 12.62½c, delivered 30 days, and in some cases, 12.75c is asked. At the present time demand is rather quiet, although large sales were made to domestic consumers during the week. Good ordinary brands of prime lake copper are held at 12.75c, cash, New York; as far as learned, however, this price has not yet been done. There were large transactions during the week at 12.50c to 12.60c.

Tin was in poor demand last week, but yesterday and today there has been an active inquiry for futures. Because of the impending scarcity of supplies and the uncertainty as to arrivals, sellers are extremely cautious in making sales for future delivery. There is an upward tendency in prices on account of the scarcity. Spot, for which there is only limited demand, is held at 34c. Afloat from London is offered at 33.25c and afloat from the Straits at 32c. A leading feature of interest is the report that the Turks have defeated English troops along the Suez canal; if this rumor be true tin shipments from the far east are endangered.

The American Smelting & Refining Co. last week advanced its New York price on lead to 3.90c, its St. Louis price thus becoming 3.82½c. At the same time independent producers raised their price to 3.80c, St. Louis. It is reported there has been a fair quantity of business at the new prices.

Prime western spelter may be quoted at 5.10 to 5.15c, St. Louis, or 5.25 to 5.30c, New York. There have been some large sales during the week but there is no special activity at present. Producers appear to be in a comfortable position and no downward movement in prices is expected in the near future.

The domestic producer of aluminum has lowered its price on spot shipment to 19c, Niagara Falls, and is not quoting generally on futures, leaving contracts as a matter of individual negotiation. Importers generally are not quoting, on account of not being able to count on arrivals. One importer of English aluminum, however, offers spot at 18c to 18.50c, duty paid, New York, and futures at 17.50c to 18c, duty paid. There has not been very much activity in the aluminum market lately.

Foreign inquiries for antimony have dropped off in this market and the situation is quiet. Stocks, however, are small and a stimulated demand undoubtedly would bring about higher prices. Prices are about as follows on spot metal: Cookson's, 17c to 18c; Chinese and Japanese, 14c. There is very little Hallett's available. Chinese and Japanese futures are quoted as follows: December, 9.75c to 10c; January and February, 9.25c to 9.50c. All these prices are on the basis of duty paid, New York.

# NATIONAL LEGISLATION IS REVIEWED

## At Annual Convention of National Founders' Association in New York

### Splendid Progress Made in the Promotion of Safety and Sanitation---President Barr Gives an Interesting Review of the Year---Major Boughton Describes the Coal Strike and Rebellion in Colorado

*Attributable largely to trade conditions prevailing throughout the year, the freedom from labor troubles in the shops of the National Founders' Association was pronounced during the 12-month period which came to a close with the eighteenth annual meeting of this society, held at the hotel Astor, New York City, Nov. 18 and 19. Strikes were declared at the foundries of only five of the members, and while several were prosecuted with unusual violence, nevertheless all were carried to a satsfactory conclusion, the openshop principle having been upheld.*

*In addition to the reports of the officers which reviewed at length the work of the year, the deliberation of the members largely were centered upon labor legislation, workmen's compensation laws and the promotion of safety and sanitation work in casting plants. As a result of the magnificent work of this committee of the society, recognition has been accorded its efforts by other organizations, and recently there was formed the National Association of Safety Organizations of which the Natonal Founders' Association, National Metal Trades Association, National Manufacturers' Association and the National Electric Light Association are members. This national safety association will eliminate duplication of effort and will facilitate an interchange of ideas impossible heretofore when each society divided its work individually without reference to the other organizations.*

*In his discussion of the Clayton bill, James A. Emery, counsel for the National Council for Industrial Defense characterized this measure as a political sop to the demands of labor. The meeting was well attended and at the annual banquet on Wednesday evening, Major Edward J. Boughton, judge advocate of the military district of Colorado, delivered a gripping address in narrative on "The Coal Strike and Rebellion in Colorado," which held his audience almost spellbound until a late hour.*

In his presidential address, William H. Barr, of the Lumen Bearing Co., Buffalo, directed attention to legislation antagonistic to the foundry interests of the country and reviewed at length the work of the society. He spoke, in fact, as follows:

"During the past year foundry interests have suffered extensively in common with most of our great industries; first, as a result of disturbing, and unfortunate tariff re-adjustments, and finally, by the great European catastrophe, which appalls all mankind.

"As in previous years, business of all kinds has been attacked repeatedly by radical politicians, misguided social workers, socialistic labor leaders, and selfish men of leisure, but there are many indications that a slight change for the better has come.

"Recent articles and editorials from the pens of careful thinkers and broad-minded writers, are voicing the opinion which we have always advanced, namely, that there is less excuse for the labor union than ever before, in that manufacturers are continually applying advanced ideas and methods for the safety, health, convenience and advancements of all employes.

"Representatives formerly imbued with pro-labor inclinations have stated that definite and adequate correction of the emotional and hostile sentiment, prevailing against manufacturers, is both necessary and proper. Confirmations of the honesty of purpose, actuating these expressions have been evidenced by equitable action in a number of committee hearings, but more indicative of fairness to corporations is the evidence of discernment by the public, in the state of Missouri, who, at the last election, by referendum ballot repealed the full-crew bill.

"In view of the pronounced pro-labor activities of the politicians of that state, the action of its voters signifies repudiation both of the labor unions and the state officers who misrepresented their constituents by passing an unnecessary law.

"In reference to the much discussed and frequently misunderstood South American trade extension, a word relative to the foundry prospects, in that country may not be amiss. The fact is that American foundries will be benefited directly only in-so-far as they furnish castings for American builders of machinery, rolling stock and mechanical appliances. There need be no fear of local foundry competition, for nowhere in Sonth America are found both ore and coal of the proper character for the manufacture of castings, in adjacent accessible localities.

"Nowhere is there a greater demand for able workmen than in the foundries, and although the molding machine and its operators have their place, our American boys must be brought forward to fill the gaps in the ranks of the skilled artisans. The necessity for unusual effort in this respect is obvious, otherwise, in the ensuing years, we may face serious dearth of finished mechanics, alike in time of labor strife and of business prosperity. Carefully trained apprentices will recognize that their services are most valuable to employers when offered free from the conditions with which unionism attempts to control them.

"A regrettable feature of the labor situation in this country is the partisan attitude of Secretary Wilson

(*Continued on page* 1004.)

# MEN OF THE IRON TRADE

**Who they are  Where they are  What they are doing**

Thomas Morrison, of Pittsburgh, has taken the place of ex-President William E. Corey on the board of directors of the United States Steel Corporation. This change became effective some time ago. Mr. Morrison is a former member of the board and was one of Andrew Carnegie's prominent partners in the old days of the Carnegie Steel Co.

W. P. Palmer, president of the American Steel & Wire Co., and other officials, inspected properties at Farrell, Pa., last week.

F. M. Sears, secretary and treasurer of Sweet's Steel Co., Williamsport, Pa., will, after Dec. 1, take an executive position with the Eckels & Nye Steel Co., Syracuse, N. Y.

John D. Williams, formerly identified with the Youngstown Sheet & Tube Co., Youngstown, is now master mechanic for the DeForest Sheet & Tin Plate Co., Niles, O.

L. H. Baldwin has succeeded S. A. Richards as superintendent of the blast furnace plant of the Struthers Furnace Co., Cleveland, at Struthers, O. Mr. Richards will remain with the company until Jan. 1.

Frank E. Drake, vice president of the American Chamber of Commerce in Paris, last week gave a talk on war conditions in Europe before members of the Westinghouse Club, at Wilkinsburg, Pa. Mr. Drake at one time was a director of the Westinghouse interests in France.

H. L. James, superintendent of the roll department of the Pencoyd plant of the American Bridge Co., recently read a paper on the Human Element in the Establishment of Standards in Scientific Management, in the lecture course on scientific management at the central branch of the Y. M. C. A., in Philadelphia.

Charles T. Swaney, formerly secretary and treasurer of the Massillon Rolling Mill Co., Massillon, O., has been elected president of the Niles Forge & Mfg. Co., Niles, O. Home Thomas is secretary and general manager of sales of the Niles concern, O. O. Hewitt is assistant secretary, and M. H. Stauffer, formerly with the American Bridge Co. at Chicago, is in charge of the plate and structural steel department.

Henry J. Weber, formerly of the Weber Foundry Co., Cincinnati, has been appointed secretary of the Wessling Bros. Foundry Co., also of Cincinnati, and will enter upon his new duties Dec. 1. The Wessling Bros. Foundry Co. has taken over the plant of the Weber Foundry Co. and will operate it.

Peter A. B. Widener, a well-known Philadelphia capitalist, is retiring from the boards of directors of various companies. He has resigned from the boards of the Reading Railway, the Reading Coal & Iron Co. and the Reading Co., and has been succeeded by his son, Joseph E. Widener. Mr. Widener remains a director of the United States Steel Corporation.

Chas. R. Crane, formerly president of the Crane Co., has made a gift to the University of Chicago to establish a winter course in the study of the Russian language and Russian institutions. Samuel Northup Harper, son of William R. Harper, who was first president of the university, has been appointed assistant professor to have charge of the courses.

A. Atwater Kent, of Rosemont, Pa., was awarded a John Scott medal for success in scientific inventions by the Franklin Institute of Philadelphia, Nov. 18. The honor was conferred upon Mr. Kent for the invention of an electric ignition device for automobiles. At the same time, as previously reported, Elmer A. Sperry of New York was awarded a similar medal for his invention of the gyro-compass.

David McNicol, vice president of the Canadian Pacific Railway, has decided to retire from his position owing to poor health, his resignation taking effect Jan. 1. His successor will be Vice President George J. Bury, now in charge of the company's interests west of Lake Superior. Mr. Bury, who is 48 years of age, has been connected with the company since 1883 and has filled a number of important positions in the west.

At the recent annual meeting of the board of directors of the American Rolling Mill Co., Middletown, O., George H. Charls, formerly assistant secretary and manager of sales, was elected vice president and manager of sales. Mr. Charls has been connected with the American Rolling Mill Co. for 12 years and his experience has been gained through service in almost every department, from the shops to his present important position.

J. G. Sing, resident engineer in Ontario for the Canadian Department of Public Works, has resigned his position on the ground of ill-health and will practice as a consulting engineer. A portion of his work will be temporarily assumed by his assistant, J. M. Wilson, who will probably be his successor, and C. H. Mathewson will take charge of the extensive harbor improvements in Toronto now in progress involving an outlay of about $7,000,000.

Lee E. Olwell has been appointed vice president and general manager of the Chalmers Motor Co., Detroit. For some time Mr. Olwell has been assistant general manager. In his new position he succeeds Lee Counselman, who will remain a director and vice president. C. A. Pfeffer, present treasurer, becomes assistant general manager of the Chalmers concern.

Frank S. Hartman recently rounded out his fiftieth year in the continuous service of The Thomas Iron Co., Easton, Pa. Mr. Hartman has been affiliated with the Thomas company throughout the greater part of its business life, having entered its employ Nov. 22, 1864. On Jan. 18, 1901, he was appointed cashier and placed in charge of the office at Hokendauqua. Since April 1, 1914, he has been real estate agent, looking after the company's farms, outlying properties, rents, etc.

Charles M. Schwab, president of the Bethlehem Steel Corporation, returning Nov. 20 from Europe on the steamer Adriatic, expressed an optimistic opinion regarding the business outlook in the United States and the belief that a turning point in industrial activity is at hand. He stated that the United States would be the only country to benefit by the war, pointing to the fact that Germany, the leading exporter of iron and steel products in the world, now is practically shut off from foreign trade and that the advantage rests with this country. "We are recovering from the shock of the war," he said. "Legislation is such that capital has more confidence and business is being stimulated. Recent legislation has been beneficial and will stimulate all commercial enterprises in the country." Mr. Schwab stated that he had brought back with him news of a surprising character, but that he was unable to make it public at this time. He admitted that he had made several large contracts with the British government before the war, but had not closed any since. Mr. Schwab was accompanied by Archibald Johnston, vice president of the Bethlehem Steel Corporation.

# Quietus on Speculators

## Is Placed by Minnesota Tax Commission, Which Develops the Facts About Iron Ore Deposits of the Cuyuna Range

An important hearing was held at St. Paul, Minn., a few days ago by the Minnesota Tax Commission in regard to the assessment for taxation of iron ore deposits on the Cuyuna range. One of the very interesting features was the speech of Chas. A. Russell, attorney for Crow Wing county and the city of Brainerd, Minn. In concluding his speech, he said: "I know there is nothing I can say that is going to bias or influence this Commission in its hearing and its decision, in any manner. If nothing more comes from this decision than one thing, I will say it has been with a good result; and that is, if it will drive from the Cuyuna range every fake corporation that is selling stock upon iron ore lands that don't contain a ton of ore, then this Commission on this hearing will accomplish something that will be for the benefit of Crow Wing county. I would find some proceeding that would stop the palpable abuse of untruthful advertising and the taking of people's money for something that does not exist."

By the report of the School of Mines to the Tax Commission and from other information filed, there has been demonstrated that there is no manganese ore in commercial quantity on the Cuyuna range, that is, ore which analyzes 40 per cent manganese. There is considerable manganiferous ore of uncertain value. One mine is operating on manganiferous ore for use by a Pennsylvania furnace. It is not known how successful the experiments will be. It was disclosed at the hearing that the total developed ore of all grades and classes amounts to 84,765,814 tons and each witness testified under oath that the Commission had been furnished complete and accurate exploration drill data.

The Commission took into consideration the high cost of exploration, mining and development equipment for a new mineral territory, as well as the state of the ore market and the grade of this ore.

The Commission has at least temporarily solved the problem of determining the assessed and taxable value per ton in the ground of this deposit by dividing it into four classes and rates: 1—Active mine, 12 cents per ton; 2—Reserve first class, 7 cents per ton; 3—Reserve second class, 3 cents per ton; 4—Arbitrary, nominal, but higher than acreage value per 40-acre tract, on low grade ore material, iron or manganiferous, or both. The equalization made by the Tax Commission may be summarized:

| | Tons. | Tax Rate. | Assessed Value. |
|---|---|---|---|
| Active mine ore. | 30,356,975 | $0.12 | $3,642,837 |
| Reserve No. 1 ore | 27,066,558 | .07 | 1,894,659 |
| Reserve No. 2 ore | 13,434,332 | .03 | 403.030 |
| Total merchantable ore..... | 70,857,865 | | 5,940,526 |
| 35 properties of low grade and manganiferous material ..... | 13,907,949 | | 65,250 |
| | 84,765,814 | | 6,005 776 |

# Human Machine

## Was Long Neglected, Says Kent—Solution of Labor Troubles

Robert Thurston Kent, editor of *Industrial Engineering*, delivered an address before a large audience of members of the Cleveland Chamber of Commerce, Nov. 24. His subject was "Capital, Labor and Industrial Efficiency", and he said in part:

"Scientific management offers the only permanent solution of the conflict between capital and labor. It does this because it is the only theory that has been advanced which gives both the employer and the employe exactly those things that they most desire. The employer desires most of all a low unit cost of production and the maximum output for his plant. The workman, on his side, wishes to obtain the highest possible wages together with the shortest working hours. It has been held that low unit cost and high wages do not go together, but under scientific management they are not only possible, but are necessary if the best results are to be obtained.

"From the birth of the steam engine up to within a decade ago, engineering has been confined to the development of machinery and power equipment. The other half of the problem, the human machine, has been neglected. It was not until scientific management came in that the same attention was given to meeting the efficiency of the man as was given to meeting the efficiency of the machine that he runs. Scientific management has approached the problem of handling labor from the same standpoint that the problem of handling machinery has been attacked. It has investigated all the phenomena connected with the handling of labor and has deducted from the facts thus obtained laws which are as infallible as the laws governing the operation of machinery. These laws are just both to the employer and the employe and plants operated under them are not compelled to contend with differences of opinion as to the justice of wages, hours or the amount of work which should be done in a day. Scientific management provides the measure by which it can determine what is a fair day's work for a fair day's pay, which is the slogan of the labor union. Much of the opposition which exists on the part of union labor with the principles of scientific management is due to the fear of union men, real or fancied, that it is simply a means of speeding the workman to the injury of his health. Nothing could be farther from the truth than this idea, because the very foundation of scientific management is the proper determination of a task which, if workmen can perform without fatigue, will not injure his health. It was not until Taylor discovered that the governing variable thing of the problems he encountered in the handling of labor was fatigue, that he was able to formulate laws by which tasks could be set. Scientific management, therefore, so far from speeding the workman to a point where his health is ruined, carefully conserves his health by fixing a task which is well within the capability of a first class workman. In doing this, however, it makes no allowance for wasted time and wasted motion, but requires that the workman perform his duties at his greatest efficiency.

"The proof that scientific management offers a settlement of the controversy between capital and labor and that its universal adoption will insure a cessation of industrial welfare lies in the fact that labor conflicts have absolutely ceased in those factories where scientific management has been adopted in its entirety. One case in particular may be cited which presented a change from the worst union ridden shop in the city to one in which the men voluntarily left the union because scientific management did more for them than the union could hope to do."

Mr. Kent's address was accorded close attention and at its close was greeted by hearty applause.

# Order for War Materials

John B. Semple, head of the John B. Semple Co., which operates a plant at Swickley, near Pittsburgh, has received an order from the United States government for 90,000 airship tracers and 60,000 projectile fuses. He is well known in the iron trade at Pittsburgh.

# British Steel Trade

## Is Expanding—Receiving Orders Formerly Taken by Germany—Large Orders for War

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, England, Nov. 9.

The pig iron market continues decidedly flat, and, in the Cleveland district, the transactions have probably been on the smallest scale of any week since the war broke out. Apparently, there has been an arrest of the decline in values, and it is hoped that the bottom has been reached. A sign of hopefulness is the putting on of two additional furnaces in the North-East district, bringing the total to 73, comprising 36 on Cleveland, 25 on hematite, and 12 on special kinds of iron. Makers are not making large forward bookings at present rates, and prefer to sell odd parcels, in the confident hope of better prices later on. There was a small withdrawal from the stores last week leaving the quantity in stock 103,336 tons. The east coast hematite pig iron trade is very flat, one reason being the declaration of hematite as conditional contraband. Mixed numbers of hematite are quoted at 62s ($14.88) for early and forward delivery. In Scotland, prices of raw iron are being shaded, but makers are not anxious to sell, and are not pressing their iron on the market.

### Finished Iron and Steel

In the iron trade, the South Yorkshire Bar Iron Association has decided to maintain its quotation at £8 5s ($39.60) for another month. Other quotations are substantially the same as to standard, but they are all squeezable where business can be done. Government demands continue heavy. After the steady decrease in prices makers are now looking for a sharp upward turn shortly.

In the semi-steel department, prices of English and American material are closely approximating. The English price is steady at £5 12s 6d ($27) for 2-inch billets. Some few offers have been received in Manchester of American billets at £5 5s ($25.20), but in view of the usual cash terms the difference is hardly sufficient to tempt business.

There is increasing evidence of expansion in the steel trade and a certain number of remittances from neutral countries show an improvement in the financial situation. The northern engineers are benefiting from orders which formerly found their way to Germany. A direct result of the war is a large demand for chrome metal sheets for the protection of aircraft and armored motors, with fair quantities of steel for military automobiles. Sheffield is now feeling severely the shortage of labor.

Enormous quantities of sword blades, bayonets and steel rifle barrels are being turned out. All the barrels of service rifles are now made of Siemens steel. Of course, for heavy projectiles huge business is finding its way to firms like Hadfields, while America for best-class steel is still a fair buyer. Very considerable inquiries and orders from the United States and Canada, formerly placed in Germany, have been received during the past few weeks.

## Ship Bill

### May be Amended in Important Particulars at Next Session

Washington, Nov. 24.—Adoption of an amendment to the ship purchase bill which would take away from the government any direct interest in new water lines which it is proposed to establish has been discussed with certain administration officials. It is understood that the matter has not been laid before the President, but it is believed he, with others who have supported the ship purchase bill as now drafted, would readily abandon it if they felt private interests would establish lines sufficient to carry cargoes from and to this country.

The amendment would permit private interests buying ships to obtain from the government loans up to 80 per cent of the cost of the vessels. The government would be secured by a first mortgage on the ships and draw 4 per cent interest on the money it loaned. Raising of the funds by the government, it is suggested, could be provided for through the issuance of bonds.

A prominent man of Baltimore, formerly interested in ship lines, who is desirous of seeing an American merchant marine established on a sound basis, has suggested the plan in discussion with administration officials. It is assumed the idea is supported by at least some who are interested in the matter as vesselmen. The ship purchase bill, now on the House calendar, provides for the establishment of lines of vessels by a corporation in which the government would have at least a 51 per cent or controlling interest. Among those who have opposed the bill as now drafted are bankers, who point out that they would not care to lend money for the establishment of ship lines which would have to come into competition with the government.

Statements have been made that Department of Commerce officials think the recently enacted shipping registry bill is working so well that the ship purchase bill may well be discarded. Some take this to mean that this is one of the numerous pleas being fallen back on as a reason for giving up the idea of passing the measure.

Only 88 ships, however, have come under the American flag since the registry law was enacted. It was predicted when the bill became a law that 200 vessels would make the transfer. Not a single new line of ships has been established as a result of the law.

## Pittsburgh Buyers More Interested

Pittsburgh, Nov. 25. (By wire.)—While demand for foundry pig iron in this district is not so heavy as it is in adjacent territory, the consumers are showing greater interest than previously. Melt has been increased moderately in the last week or ten days and some consumers are asking prices on No. 2 and No. 3 grades for prompt and future delivery. One melter in the immediate district is negotiating for 1,000 tons of No. 2 foundry. Small lots are being sold at a range of $12.75 to $13.25, valley.

## Box Cars Ordered

New York, Nov. 25. (By wire.)—The Illinois Southern has ordered 300 box cars of the Haskell & Barker Car Co. The Boston Elevated asks for 100 steel coaches. Purchases of cars reported by daily press as is in contemplation by Russia and other foreign countries have not been confirmed.

**For the Belgians.**—The employes of the Northern Iron Co., Standish, N. Y., have contributed $165.50 for the relief of suffering Belgians. The amount has been forwarded to the Belgium Relief Committee, 10 Bridge street, New York City. No subscription was in excess of $1.

Adjudication of the Magee Furnace Co., Boston, which recently filed an involuntary petition in bankruptcy at the instance of creditors, has been ordered by the United States district court. The case has been sent to Referee Darling, of the United States bankruptcy court.

# THE ABC OF IRON AND STEEL

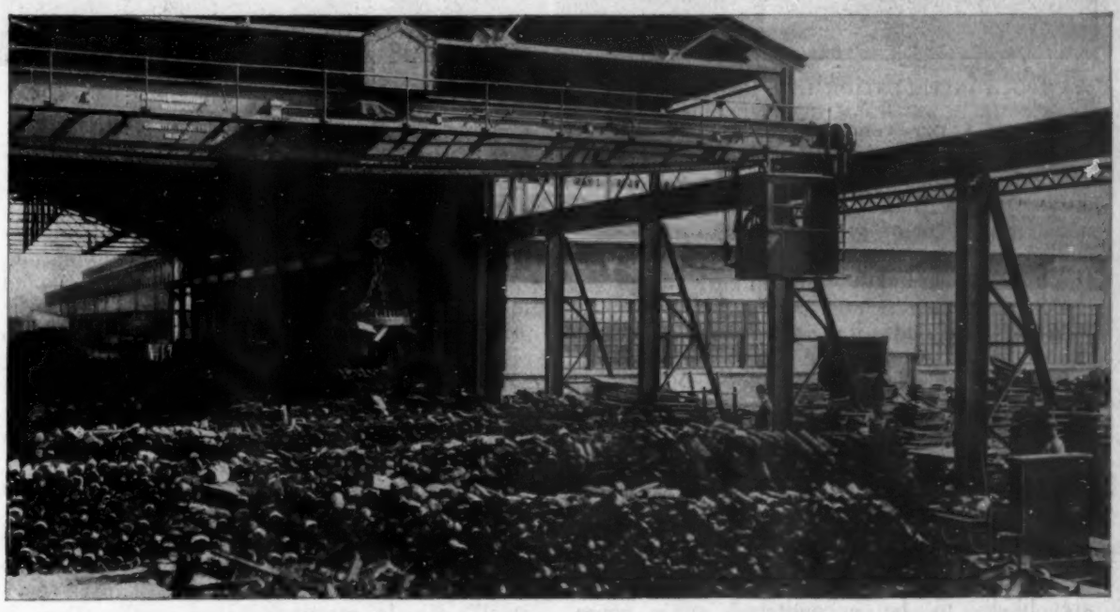
# Making Gray Iron Castings

BY DR. RICHARD MOLDENKE

THERE are few materials of construction exhibiting the variety and very sharply contrasted properties found in cast iron. Iron castings may be soft enough to be machined with the greatest ease, and *per contra* as hard as glass. They may be so weak that they are unfit for anything better than sash weights, and on the other hand almost as strong as ordinary steel castings. In physical structure they may show a fracture all the way from silver white to almost black. Depending upon the composition of the metal produced, and the manner of casting it, there is made available a range of qualities from which a satisfactory selection is possible for many different purposes. A glance at a list of uses for cast iron shows this very quickly. Agricultural machinery, air, ammonia, steam and hydraulic cylinders, automobile cylinders, pistons and rings, annealing boxes, bed plates, brake shoes, car wheels, crusher jaws, electrical castings, flywheel and general machinery castings, gears, grate bars, cannon, hardware, ingot molds, locomotive and car castings, ornamental work, fittings, plow points, pulleys, pumps, chilled and sand rolls, water and soil pipe, stove and furnace castings, valves, etc. All of these varieties of castings have a composition differing somewhat from each other, have their own special excellencies, and account for the wide ramifications of the foundry industry of today.

In order to understand what cast iron really is, its range of composition must be studied

The following articles of this series previously have been published in THE IRON TRADE REVIEW: "Iron Ore and Mining Operations," Jan. 5; "Beneficiating Iron Ores," Feb. 2; "Rules for Figuring Penalties and Premiums on Lake Superior Iron Ores" March 9; "Transportation of Iron Ore on the Great Lakes," March 16 and April 13; "Ore-Handling at Lower Lake Ports," Oct. 12, 1911; "The Manufacture of Bee-Hive Coke," Jan. 4, 1912; "Pig Iron and Its Method of Manufacture," Jan. 2; "Manufacture of Wrought Iron," Feb. 6; "Manufacture of Crucible Steel," April 3 and April 10; "Manufacture of Open-Hearth Steel" May 15, 22 and 29, June 5 and 12; "The Rolling Mill Industry," Aug. 7, 14, 21 and 28; "Wire and Wire Rods," Oct. 2, 9, 16, 23 and 30 1913; "Making Bessemer Steel," May 21; "Making Steel Castings," Aug. 6, 20 and 27; "Making Malleable Castings," Nov. 5 and 12, 1914.



FOOD FOR THE CUPOLA

Pig iron storage yard in a middle western gray iron foundry. The pig iron is handled by a crane and magnet

and the effect of the several elements present considered. First of all comes the carbon content. This will roughly run from 3 to 4 per cent, and may be in either the entirely combined form, as in white iron, for one extreme; and entirely uncombined—mechanically mixed graphite—as in dead gray iron, for the other. Between these two limits there may be any combination, and this relation depends upon the percentage of the other elements present, notably the silicon; the rate of cooling from the molten state (a function of the thickness of section), and the temperature of the metal poured, to a somewhat less degree.

The effect of silicon in cast iron is to draw out graphite at the moment of set. In the absence of silicon the carbon present remains in the combined form. Hence, commencing with no silicon, and consequent dead white and hard iron, there is a regular progression of fractures, becoming grayer and grayer, until at about 3 per cent silicon, everything else being equal, the iron is dead gray and soft. The effect of sudden cooling in a measure prevents this action of silicon, and this is taken advantage of when making the so-called chilled rolls, car wheels, crusher jaws, etc. In these cases, by the selection of the proper silicon percentages, and application of "chill" faces in the molds, it is possible to get fairly exact thicknesses of hard white metal with a soft, machinable background.

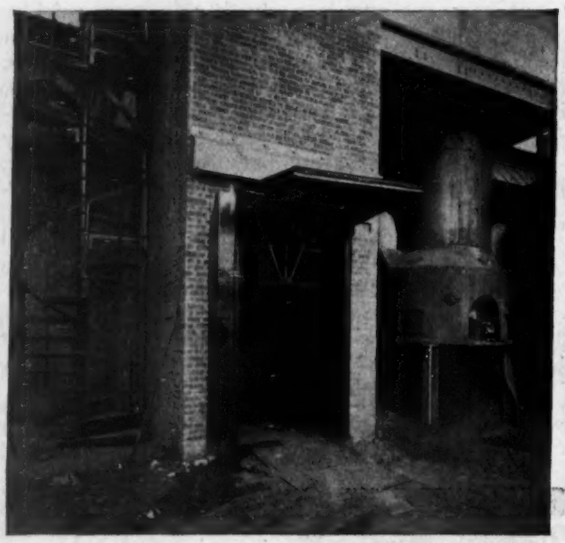
Manganese is another element always found in cast iron. Below 1 per cent it has but little effect on the character of the casting. Above this it begins to harden, or hold the carbon in the combined form. Manganese below 0.50 per cent in the ordinary run of castings, means that attention must be given the melting practice and mixtures, as oxidation troubles are likely to be encountered with consequent danger of damage to the castings.

Phosphorus is another element present in cast iron. If around 1 per cent, the fluidity is greatly increased, as for stove plate and ornamental castings. For the regular run of work, this element should not exceed three quarters of this amount, and for special work it may have to be quite low.

Sulphur is the last element of importance, and only less so than silicon. It hardens and weakens cast iron, is undesirable in almost every way, is unfortunately always added in greater or less proportion in cupola melting, and is the one point that will claim the attention of the industry in the not distant future, as the percentage is constantly rising in the foundry product, owing to the proportion of scrap necessarily carried in the daily heats.

With the above chemical considerations in view, it will be readily seen that cast iron is in reality a steel of a carbon content corresponding to the combined carbon present and with its graphite content in mechanical admixture. Hence, a cast iron with say 0.20 per cent combined carbon, and 3.55 per cent graphite (which would mean about 2.50 silicon, 0.60 manganese, 0.05 sulphur and 0.450 phosphorus) would in reality be a twenty-carbon steel with so many crystals of finely divided lubricating graphite interspersed within the structure, that machining becomes easy and no oil is used or required. On the other hand, a cast iron with say 0.80 per cent combined carbon, and hence only about 2.95 graphite present, makes this an eighty-carbon steel, with very much less lubricating material to assist in machining what nearly corresponds to a tool steel in hardness.

The interesting deduction from the above reasoning is that the steel additions now so generally used, the product being called "semi-steel"—simply mean that the total carbon is lowered and with the proper silicon content



A CUPOLA INSTALLATION IN A MODERN FOUNDRY

CHARGING FLOOR OF A GRAY IRON FOUNDRY

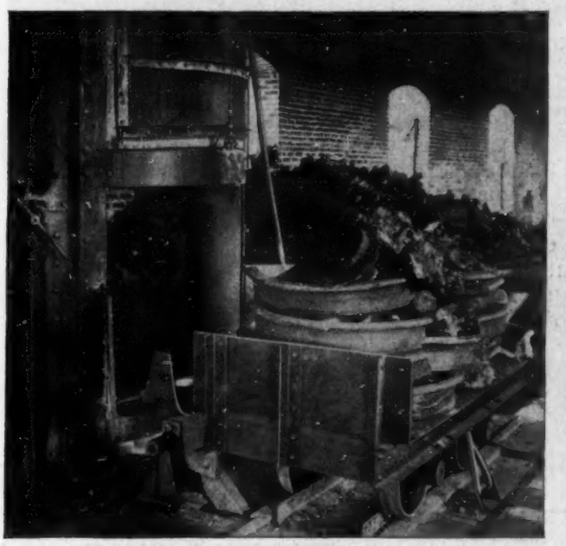
adjusted so that the combined carbon remains unchanged, there will be much less graphite thrown out within the structure. It therefore remains machinable to almost the same extent as ordinary cast iron, but is much stronger, as there are fewer planes of weakness to start failure under strain. The product, no matter whether 5 or 50 per cent steel is used, remains cast iron.

A further interesting point is that the steel structure of cast iron is in reality hardly recognizable as such. What would be thought of a steel with say 2 per cent silicon, 1 per cent phosphorus, and 0.15 per cent sulphur?

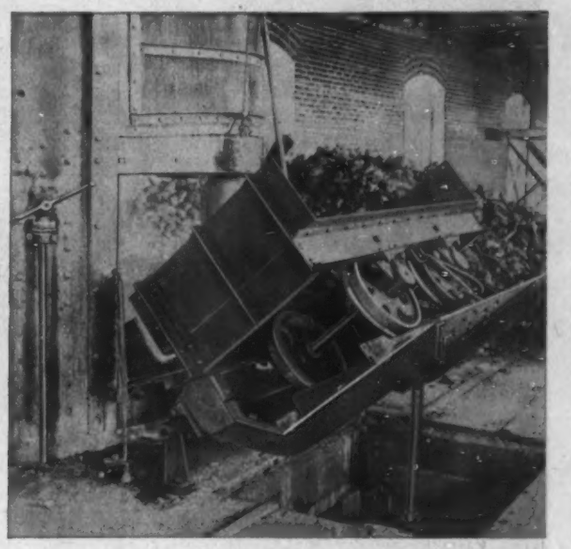
With reference to the physical phenomena observed in cast iron, we shall first consider the strength. A very soft and yet serviceable cast iron may run as low as 12,000 pounds per square inch, and with proper composition and melting another variety may be obtained with four times this strength. Piston rings for automobiles may be made so soft that all the wear is taken over by them; and then again, grinding mullers of chilled cast iron, very high in total carbon, are excelled only by manganese steel castings for durability. The lack of homogeneity of cast iron makes the tensile test an undesirable one unless very great precautions are taken to have the alignment perfectly true. A side pull immediately drops the results very appreciably. Hence the transverse test is almost universally used, the standard test bar being 1¼ inches round, cast upright in a dry-sand mold, top pour. This bar, tested on supports 12 inches apart, should give at least 2,200 pounds for good serviceable work, such as machinery castings and the like. Very good cast iron, particularly that to which some steel has been added, will show as much as 3,500 pounds transverse strength.

Cast iron shows its best qualities under a quiescent load. That is to say, its compressive strength is most marked. Steel is far stronger on a pull, and particularly so on bending, cast iron being quite brittle and not very elastic. Cast iron is also not good against shock, and hence very large factors of safety have to be introduced where moving parts of machines are made of this material. On the other hand, it is very stiff, and being quite cheap when compared with steel, can be used in generous proportions. Being readily cast into every conceivable shape, cast iron is universally used, so that the annual melt in the United States alone runs above 6,000,000 tons.

A further important physical phenomenon to be reckoned with in cast iron is its shrinkage in volume on cooling from the liquid to the solid form. The net result in the molecular changes observed is that there is a greater or less reduction in volume noticeable in a finished casting as compared with the pattern from which it was made. This reduction is two-fold. That from the shrinkage above mentioned which is due to the reduction in volume on setting, and the further contraction of the metal from the space occupied while red hot. As the mold is poured, a thin shell of solidified metal forms almost immediately, then the metal begins to set inward, contracting as it does and thus leaving a void in the center. This void is supposed to be filled by constant feeding of liquid metal from the pouring basin through the thin gate. Unless the metal is long-lived, and can flow readily for some time, this gate sets quickly, and the casting exhibits porous metal adjacent to it. Hence the difficulty in getting sound castings where heavy and light sections join, and the necessity of a thorough understanding of the metal when designing cast iron constructions of any kind. In white iron castings this



A LOAD OF CAR WHEELS ON PLATFORM OF CUPOLA CHARGING MACHINE



CUPOLA CHARGING MACHINE IN ACTION

MOLDING FLOOR IN A CONTINUOUS FOUNDRY MANUFACTURING PIPE FITTINGS

phenomenon is more marked than in gray ones. We deal with a contraction of about ⅛-inch to the foot for gray iron, and about ¼-inch for white iron. The art of the patternmaker comes into play in allowing for this somewhat varying "shrinkage" in the make-up of a pattern for a given casting.

Mention has been made of the rate of cooling in its effect upon the fracture of cast iron. The effect of "chills" on irons of low silicon content is immediate, giving white iron for predeterminable distances inward. Naturally the effect of the damp sand in the molds to be poured can also be noticed, and with low silicons, as in the case of iron for malleable castings, the metal will be completely white in fracture in thin sections, and may be entirely gray in thick ones, making for good and bad castings respectively in this branch of the iron industry. It will be seen, therefore, what chances there are for differences in structure even in the high silicon, or all gray castings. Indeed there is a marked difference in structure in every casting on comparing the skin with the center. Hence the effect of corners, thin webs, sharp angles, etc., which should be avoided as much as possible. This explains the remarkable lack of homogeneity of cast iron, the chances for segregation, giving different sulphur percentages in various parts of the casting, and allowing for the solidification of certain iron compounds before others, and par-

CLEANING ROOM IN A MODERN GRAY IRON FOUNDRY

ticularly the possibility of oxygen compounds with iron in very minute percentages in spite of the comparatively high carbon content.

*Raw Materials Used*

The materials used in connection with the production of iron castings are as follows: Pig iron of various compositions, scrap sorted out into a number of qualities for given purposes, fuels for melting, molding sands for making the containers for the molten iron, and the smaller supplies such as facings, fluxes, ferro-alloys, etc.

Pig iron, thanks to the progressiveness of the American foundry industry, is now sold by analysis nearly altogether. Europe has still to feel the beneficial effects of this procedure, which has not only given our foundrymen the key to more exact work on their part, but has also relieved the blast furnaces of the burden of unjust complaints based on fracture guesses and resulting foundry losses. The making of castings at the blast furnaces, still used in some parts of Europe for making pipe and larger classes of work, is not to be recommended, unless provision is made to reduce shrinkage difficulties by suitable scrap additions in the ladles before pouring. American specifications have wisely precluded the use of this metal for important work, as it is unreliable. Remelting the pig iron, however, obviates the difficulties, and hence the only use there is to be found for "direct metal" at the present day in this country is in making ingot molds. Since the general introduction of selling pig iron by its analysis, so that the foundryman knows exactly what he gets, it is possible to obtain practically anything in the way of an analysis that may be desired. Fortunately, given classes of castings require merely keeping below certain maxima of the elements, apart from silicon, so that a furnace working on high phosphorus ores would naturally supply the stove trade with pig iron, etc. The standard specifications for pig iron give the leeway allowable for every element in shipping to a foundry, and there need not be the slightest difficulty in making castings come out right, if the foundryman understands his business.

Scrap cast iron forms the second big item in the make-up of a mixture for melting purposes. Since scrap as purchased from the dealers originally formed the parts of useful machines, and simply broke from service conditions, it is quite easy to sort this material so that scrap stove plate goes to stove foundries, scrap machinery parts to the jobbing foundry, etc. While there is an uncertainty as to composition, due allowance can always be made to play safe. Since in pouring off a heat a certain percentage of the melt goes into sprues and runners, as well as imperfect castings, another item of the mixture is made up of this material, which should be used up daily, so as not to accumulate. The mixtures going into the cupola or furnace would then be made up of say 60 per cent pig iron, all the sprues of the previous day, say 20 per cent, and purchased scrap for the remaining 20 per cent. These percentages can be varied readily. Oftentimes it may become necessary to use nearly all pig iron, the balance being the sprues made. Again for unimportant work the percentage of scrap may be increased to nearly 100 and

A MODERN FOUNDRY YARD WITH ELEVATED COKE BIN OVER DRYING OVEN

yet good results obtained. It is a matter of dollars and cents to the foundryman. The more scrap he uses the cheaper the mixture, but the greater his chances for lost castings and dissatisfied customers. Hence each foundryman draws his own line and stands or falls by it.

*Melting Processes*

The fuel used for melting brings up the question of melting processes. Cupola melting may be considered the standard method, as it is the cheapest and easiest to operate. Here, after providing for a bed of fuel—usually coke—the mixtures of metal are placed in alternate charges with more coke, air is blown in to render the fuel incandescent, and the metal melts regularly and continuously. Depending upon the degree of skill with which a cupola is charged and operated, the castings will be merely fair or extra fine in quality. The question of rational cupola melting practice forms an entirely distinct chapter in the metallurgy of cast iron, and cannot be gone into at this time.

The second method of melting is by means of the air furnace. Here the entire charge is placed upon an inclined hearth, firing is done at one end, the charge is duly melted and poured at as short an interval of time as possible. Since the fuel does not come into direct contact with the metal, its quality is better than is the case with cupola iron of identical composition. Here also it may be said that air furnace melting forms a special division of the art, which must be mastered before it is possible to realize dependable results.

Finally the open-hearth furnace should be cited as the ideal melting method, which, however, on account of its cost and requirements of steady operation, has not found an introduction into the industry to any extent. When the time comes for quality demands irrespective of a slightly advanced price, more will be heard of this method in the gray iron foundry.

There being 6,507 foundries in North America, according to a careful investigation made by *The Foundry* in September, 1914, it is but natural that all kinds and conditions of plants for the production of castings will be found. From the tumble-down barracks, perfectly capable of making fine castings—and sometimes with a very low "overhead" charge, progress will be seen up to the ideal plant in which repetition work is turned out with astonishing precision and cheapness. Since only those plants can live which are located properly with reference to shipping and receiving facilities, they will practically all be provided with railroad or water connection. The progress of the material should be as direct as possible from the yard through the foundry proper, then to the finishing departments, and finally to the shipping point. Deviation from this principle means extra handling, and hence additional cost.

The buildings most recently erected for foundry purposes all show great attention to lighting and ventilation. Modern life demands that better facilities be given the men to work under, and a core room placed in any old corner and formerly oftentimes illuminated by a few gas jets, is now rarely found. The

A WELL LAID-OUT FLOOR OF MACHINE MADE CYLINDER MOLDS

American custom of specializing in particular lines of work has resulted in a remarkable development in those directions in which duplication in enormous numbers is possible. Thus our stove shops, car casting foundries, roll works, car wheel foundries, are perfect wonders of efficiency—in fact have to be to live at all—and consequently every part of the establishment, beginning with the yard, then the buildings, and finally the equipment come in for the most careful study and exact execution. In the larger establishments will be seen elaborate crane systems, covering every foot of floor space, and with surplus power of movement, so that no shop operation has to wait. Again, in other foundries, where small molds are the rule, an overhead carrier system distributes the metal and collects the castings, etc. Labor costs money every time a piece is touched, hence the replacement of every bit of labor economically possible.

### *Use of Molding Machines*

The molding machine, in some form, is now universally employed. Whether the ordinary squeezer or the ponderous jarring machine, physical labor is being conserved, time is saved, and efficiency is realized in a greater measure than ever. In establishments which have the advantage of so enormous a demand that continuous operation is profitable, and where the shape and weight of the castings may lend themselves to the purpose, special installations have been designed for mold-conveying. Molding machines are placed so that the operatives have merely to turn around to place the completed mold on the carrier system. The platforms, conveyors or suspended carriers travel along in front of the cupola system, and the molds are poured. At the end of the system, which is long enough, and runs slow enough to allow the metal to set properly, the molds are dumped over a grating, the sand drops through, the castings are removed for cleaning purposes and the hot sand is re-tempered and fresh molding sand added. An overhead conveying system takes the sand back to the machines, and thus the operation is continuous.

Air brake parts, radiators, pipe fittings, etc., are produced in enormous quantities in this manner at marvelously low shop costs. There is no reason why the idea should not be extended, so far as continuous melting is concerned, to the ordinary large shop, molten metal being made available all day long and poured into molds as completed, wherever these may stand. In this way the molding day will be longer and the cost per ton of castings for this operation correspondingly reduced.

Furthermore, any system of continuous operation saves labor. In spite of the remarkable development of the molding machine, very little provision has been made for removing and parking the molds, as compared with ordinary hand work. Hence the operatives have the back-racking and generally killing labor of carrying the molds a greater or less distance from the machines. This is the weak element of the molding machine problem.

Referring to the molds proper, these are either of so-called green sand, dry sand or of loam. Molding sand is an aggregation of grains of silica, somewhat rounded by wave-action, mixed with about one-fifth the quantity of a more or less fat clay. The result is that on wetting such a clayey sand it will ball together to a slight extent, sufficient to retain its shape when pounded about a pattern. Into the container thus made the molten iron is poured; suitable sand cores placed within the mold leave openings in the casting as desired. It is the refractory quality of the sand which allows the molten metal to remain in contact with it without danger of fusion, and it is the porosity of the mold, in spite of the ramming given the sand, which allows the escape of steam and gases generated.

The finer the grain size of the sand, the rounder the grain itself, the fatter the clay ingredient, which should be as free from fluxes as possible, the finer the surface appearance of the castings made. Necessarily a very fine grained sand will not always carry off the gases in the quantity required for heavy castings, nor will any very fine sand stand a stream of metal flowing over a given spot without cutting badly. Hence the necessity of more open and therefore coarser grained sands for the medium and heavy castings, and as a consequence a somewhat poorer surface is obtained.

Drying the green sand mold gives what is called the dry sand mold. It is an interesting fact that the strength of the mold to resist changes in form is very considerably increased by this drying action. Moreover, there are less chances of losing the casting by reason of surface defects as well as iron troubles emphasized by the cooling effect of the damp sand. Modern foundries are, therefore laid out with a far greater drying capacity than was formerly the case, so that the drying of molds can be carried out at very low cost, and a greater percentage of castings saved.

Loam molding is the most difficult portion of the molder's art. The loam itself is a molding sand with a very high clay percentage, or else is specially mixed up, and when tempered with water becomes practically a mortar. Loam molding is used only for very important and heavy castings, and where the use of patterns is to be reduced to a minimum. For a backing, upon which the loam mortar is thrown and swept to dimension, common brick is used, space being left be-

tween these and filled with cinders to properly vent the structure. As these molds have to be thoroughly dried, they become in effect fireclay structures strong enough to resist the pressures applied by the molten metal under a high ferrostatic head. The surface, carefully finished with graphite in a clay wash, is sufficiently refractory to resist any action of the iron, and if dried so that it does not spall off, this method of molding gives the best results. However, owing to the time taken, and hence expense, loam molding is gradually yielding to the dry sand method, particularly as the practice of making very large cores to form parts of the molds is growing.

*The Core Room*

The core room, formerly the most neglected part of the foundry, is now receiving the attention it should have. The action of dry and wet binders has been studied and the cost of core-making so reduced that it no longer is considered the necessary evil it was. The importance of giving the core ovens close study in design and operation cannot be overestimated, for the casting losses through "blowing" cores are usually quite appreciable, and certainly entirely avoidable. There are really two stages in the operation. First, the actual drying, or evaporation of the water contained. Second, the baking at comparatively higher temperatures. Considering the fact that some binders have the habit of working outward to the surface, and in drying there form an impervious skin, a core may go into the mold quite damp in its interior, with possible bad consequences to the casting.

With properly made molds and cores there should be no difficulty in getting the right kind of castings. After pouring, the molds should not be shaken out until the castings are almost black hot, as warping and skin hardening troubles may take place. On the other hand, in the case of intricate and large work, it may oftentimes be necessary to uncover portions of a casting in the mold to let it cool quicker, and thus counteract a tendency to strain and even crack some portion. Even in molding provision is made for cooling the metal more rapidly in certain critical places. Thus, during the Civil war, many guns were cast with the bore cores provided with circulation water enabling a more rapid cooling of the metal, without, however, chilling it. The result was a very close-grained and strong metal where it was most needed.

Further, in the case of large gas engine and other castings of this kind a well known foundry expert constantly uses water pipes embedded in the green sand, and has water circulating during and subsequent to the casting operation. This happens to be the only way to avoid an excessive discount for bad work.

The castings, as taken from the sand, should retain most of the "burnt" material. In this way the refuse sand will not contaminate the sand piles, which are brought up to quantity and quality daily by the addition of "new" sand. The castings go to the cleaning room, where the adhering sand is brushed off, smaller work goes into tumbling barrels where the use of "stars" of hard iron cleans them properly. At the present time, much work is sand-blasted. In fact, it is one of the requirements of the present day to ship castings cleaned by the sand-blast, as this gives the best appearing surface and also shows up surface defects rather glaringly. Where castings are to be galvanized or tinned, pickling is resorted to. Sand blasted material lends itself to pickling and eventual enameling or galvanizing more readily than the other forms of cleaning.

A curious phenomenon is observed in the case of the tumbling barrel. It seems that the constant shocks to which a casting is subjected ease up the interior strains and hence strengthen the material. Or rather they removes a source of weakness. Hence, test bars should not be rumbled, as otherwise they are not safely comparable with the work they represent.

After coming from the cleaning department, or while in it, the necessary chipping and grinding operations are performed on the castings. In modern plants, the air hammer is used, cutting the comparatively soft and brittle metal readily. As this class of work is expensive, it will be seen that proper attention in the molding department so that the fins left on castings may be a minimum, pays handsomely. In fact, prevention is always better than cure. Again, many a casting which may be expensive to mold and is of considerable value, is oftentimes lost on account of a slight defect. A boss may not have run up full, or a lug was spoiled by the breaking of a core. Here the foundry is perfectly able to "burn on" a new part. The casting is simply bedded properly in molding sand at the point affected, the metal is heated up to redness and a flow of molten metal run over the fracture. The surface is melted and unites with the new metal readily. As the adjacent parts have been heated up well, there is no danger of undue straining, and the casting has been saved.

Within recent years the oxy-acetylene flame has come into use extensively in repairing castings. The great value of this process, however, is found in repairing castings upon which much machine work has already been done. In a foundry and machine shop combined, particularly where much repair work

(*Continued on page* 1014*b*)

# Safety Around the Blast Furnace

## An Outline of Regulations Proposed by the Bureau of Mines Covering the Construction and Operation of Blast Furnaces

BY F H WILLCOX

THERE are three facts concerning conditions of employment at blast furnaces to be borne in mind in framing regulations productive of safe working surroundings.

The first is the character of the labor. Illustrative of the experience of large companies in this connection is a statement of the president of the National Tube Co. "There has been," he said, "a marked decrease in the intelligence of blast furnace workmen during the past 12 to 15 years, largely, we believe, because intelligent men do not wish to work seven days per week, and therefore seek employment in other departments." Interesting also is the statement of Edgar S. Cook: "The grade of employes in the blast furnace business will average lower in intelligence than in the more advanced forms of manufacture, as, for instance, finishing mills and steel works. It is only unskilled labor that will continue to work about blast furnaces. These men are trained to do the routine work so that while they become semi-skilled, yet the work calls for little other than so-called common labor. Compared with the number of men employed, the number of positions calling for experience and skill and accompanied by attractive salaries are few. The men, therefore, that develop industry, application and brain power outgrow their opportunity at the furnace and seek employment where there are better chances of advancement."

These opinions were expressed prior to the inauguration of the six-days-a-week scheme of employment. Developments since then indicate that the grade of furnacemen is at present better than the above statements would indicate, because the six-day week has to some extent eliminated from those seeking employment at furnaces the class who desire only the opportunity for maximum work and earnings with the end in view of acquiring a competence and returning to the old country. The advantage accruing from this elimination of a transitory force is offset to a degree by those experienced men who left furnace work on account of the curtailment of earning power.

Portions of a paper read at the second annual industrial welfare and efficiency congress, Harrisburg, Pa., Sept. 17-19. The author is connected with the U. S. Bureau of Mines.

Also the safety movement has most markedly promoted the efficiency of furnace crews. The lean year through which the furnace industry has passed has eliminated from the furnace plants a considerable proportion of the floating labor, the older, more efficient and intelligent men being retained. This is, of course, a temporary state of affairs, and to it may be attributed a part of the very good reductions in accidents being accomplished this year. With resumption of capacity and taking on of new unskilled and inexperienced hands, there will be reason to anticipate an increase in accidents.

The second condition to be noted is the irregularity of employment. The maximum changes in average daily production over seven years are as follows:

| | | | |
|---|---|---|---|
| 1907 | 34,700 | tons | decrease |
| 1908 | 22,300 | tons | increase |
| 1909 | 27,000 | tons | increase |
| 1910 | 28,300 | tons | decrease |
| 1911 | 13,200 | tons | increase |
| 1912 | 25 400 | tons | increase |
| 1913 | 26,200 | tons | decrease |

The 1910 census figures give an average daily productiou per man employed of 1.8 tons pig iron; at present it is more nearly three tons. The significance of the tonnage fluctuation appears when we transform tonnage fluctuations to employment variations which take account of the number of men taken on or discharged on account of expansion or curtailment:

| | | | |
|---|---|---|---|
| 1907 | 11,500 | men | dismissed |
| 1908 | 7,400 | men | hired |
| 1909 | 9,000 | men | hired |
| 1910 | 9,400 | men | dismissed |
| 1911 | 4,400 | men | hired |
| 1912 | 8 500 | men | hired |
| 1913 | 8,700 | men | dismissed |

This indicates a fluctuation of from approximately 10 to 32 per cent of the total men employed at furnace work from year to year. This is existent throughout the year, the average daily production by months showing, except in six months in the last three years, variations of from 1,000 tons to 10,000 tons daily production by monthly average. The handicap to safety, carefulness and experience in the crew must be apparent to all familiar with handling labor.

The third item to be emphasized is the character of the hazard in furnace practice.

Considering that men about furnaces are not of the highest paid grade, that new men are constantly being added to the force both in normal operation and by reason of fluctuating production, and that these men are not only exposed to average industrial hazards but also to an added hazard peculiar to the handling of and work about molten metal and slag, hot, poisonous gas, flue dust, etc., and finally to the more or less remote but ever-present possibility of breakouts, explosions, heavy slips or other unexpected or great dangers, it becomes apparent that the fundamental idea toward which regulations should aim ought to be a detailed, explicit statement of features of construction, operation and practice, to include every practical safeguard and every manner of practice that can be reasonably insisted upon. Such a program is not quite as formidable as it looks at first glance. The layout of furnace plants is essentially the same, and it is not more difficult to state ideal conditions which 40 blast furnace plants should conform to than it is for 40 machine shops, foundries or woolen mills—it need not interfere with design, operation, tonnage or production costs.

It is not the function of the United States Bureau of Mines to state what any operator must do. It is its duty to point out what any operator may do, or to co-operate and advise with state bureaus in making conditions of employment more safe.

In presenting the following suggestions for regulations, it is desired only to point out the field for regulations, to indicate the possible scope of the ruling and to emphasize that safeguarding should be carried out to the fullest extent, and that, in so far as the state is authorized to do so, certain methods of practice should be insisted upon. To attempt to lay down regulations is both futile and dangerous, until study in the field and consultations with men experienced in operation and accident prevention has been undertaken and a constant exchange of ideas secured.

Asphyxiation results from work about bosh, bustle pipe, mantle, jacket or shell and furnace top, when changing bronzes, watching water, flushing plates, making repairs, oiling, charging, examining and changing bells, hoppers, wearing plates, etc., cleaning or repairing gas or blast

mains, dust catchers, downcomers, water valves or chimney flues, cleaning or repairing stove checkers, etc., work inside gas washers, work inside boiler settings, work in connection with goggle, sand or damper valves, sewers carrying waste water from gas cleaners or making repairs to stock line. The condition of the equipment in regard to leaks and of buildings in regard to ventilation where gas-handling apparatus is installed, such as boiler houses, gas cleaning buildings, gas engine houses, basements, should be given attention.

The safeguards required include thoroughly railed platforms and walks at all elevated places where it is necessary to work in proximity to furnace gas; gates as automatic warnings at approach to hazardous places of work, locking devices for operating valves, levers or switches on bells, boilers, stoves or gas washers; approved design of water seal valves and use of a mechanical valve in connection with water seal where work must be done in mains in proximity to an operating furnace, approved methods of drafting out gas flues, scrubbers, etc., before working in them, and tests for presence of furnace gas in enclosed places where it is necessary to work.

*Explosions of Gas, Metal and Slag*

Metal and slag are liable to explode at any point from the furnace to destination while still in molten condition. Mechanical safeguards are for the most part futile, though shields may be specified for certain places where there is a certainty of there being an occasional shot on account of dampness. For the most part, however, the prevention of the hazard depends upon care in drying tools, gates, troughs and ladles. Insistence upon personal inspection by the foreman in charge may obviate many of these accidents.

Explosions of gas are somewhat common—for the great part they are only "shots" or "cracks" at the burners or at the top. Occasionally they unseat a burner or blow open an explosion door. Explosions of plant-wrecking character come rarely, but any furnace man can recall several instances within the last few years. Many explosions resulting in no loss of life do not become known. Occasions of hazard are found in blowing in when the gas is brought down and lighted, in blowing out, when attempting to draft out the mains, dust-catcher and furnace and in putting too much water in either by accident or design. There is absolutely no safeguard that can be specified. The use of steam has been attended with explosions. The situations often arise suddenly, and can be met only by experience, coolness and common sense. The use of steam mixed with the gas or to interpose a blanket between air and gas is attended with success in many cases only where it is used with understanding and considerably in advance of the danger point.

Blast main explosions cannot occur, supposedly, if the blowing engines are turning over. Unfortunately, when they do occur, they leave no evidence behind. The use of automatic check valves in the hot blast and cold blast mains, at the hot blast valve, in the mixer pipe, automatic stops to prevent engines from turning over backward, and the use of steam to flood the cold blast main should the engines stall, drop their hooks, etc., should be considered.

Breakouts above the mantle or rupture of the shell are extremely rare nowadays. Bosh breakouts occur at long intervals, as do breakouts at the tuyere breast. Hearth breakouts still remain with us. Aside from the draining the hearth, no harm usually results from a hearth breakout, provided the metal does not come in contact with water or damp sand, brick or rubbish. Logically, it may prove feasible to urge elimination of deep ditches, substituting for them cooling by cast iron plates inside the massive steel jacket, or pipes cast in the iron or steel jacket. If the latter is rigidly bound together by heavy bands and links, with an increase in strength, the brick can be laid tightly against the jacket, with thinnest joints, the heat expansion of the brickwork, making a tightly bonded mass of brick, in which no cleavage cracks may develop through displacement, thus affording the metal no opportunity for escape to the inside face of the jacket.

Ample means of exit from the front and sides or back of the cast house should be provided, and some measures taken to keep other than the cast house crew from loafing about the furnace. There are many signs by which the cast house crew or foreman can sometimes anticipate a breakout with which other members of the force are not familiar.

*Furnace Slips*

Slips vary in violence from mere "rolls" to slips of explosive violence which may empty a furnace. No furnaceman wants them—the more regular his operations and the less slipping, the more uniform his grade of iron and, as a rule, the greater the production. He can be relied upon to eliminate them by every device of practice known. There remains some items of safeguarding to insist upon, including the provision of means of quick exit from the furnace top other than down the skip incline, a shelter house on top for refuge, coverings over bell cylinders and sheave wheels, skip hoist operators' houses, substantial roofs over cast houses, and a warning whistle to enable the foreman or skip operator to give timely notice to yard, trestle and stove cleaning men of an impending slip.

To summarize, briefly, it is the idea of the Bureau of Mines in issuing any circulars or in advisory and cooperative work on safety with operators or states, to deal with the subject as fully as possible. It is felt that on account of the peculiar hazards of the blast furnace industry, the character of the force, and the fluctuations in production and operation, regulations should be very definite and explicit, arrived at through co-operation with the operating men of the country.

## Chain Drive Solved Problem

The Diamond Chain & Mfg. Co., Indianapolis, is sending to the trade a six-page folder outlining the problems which confronted the engineers of the Canadian Consolidated Rubber Co., Ltd., St. Jerome, Que. Additions to equipment necessitated an increased load of 25 horsepower on a line shaft which is driven from a water wheel shaft. The line shaft had ample capacity to accommodate the additional load, but at the speed of the line shaft, which could not be increased, the drive connecting the two shafts already was taxed to its limit. The solution of the problem depended upon a more efficient drive from the water wheel shaft to the line shaft, or the installation of an auxiliary motor to provide for the additional load. The slow speed of the water wheel shaft would have required a belt 60 inches wide, while the center distance of 13 feet 6 inches would have necessitated the use of gears approximately 18 feet and 9 feet in diameter. Either equipment would have been expensive and the problem was solved by the installation of chain drive furnished by the Diamond Chain & Mfg. Co., Indianapolis.

The American Institute of Chemical Engineers will hold its seventh annual meeting at the Hotel Adelphia, Philadelphia, Pa., Dec. 2 to 5. A large number of papers bearing on the chemical industry will be presented.

# Turbine Geared to Rolling Mill

## Interesting Installation at Plant of Carpenter Steel Co. Where Mixed Pressure Turbine is Utilized for Rolling Steel, Resulting in Appreciable Steam Economies

IN AN exceedingly interesting installation at Reading, Pa., the Carpenter Steel Co. is employing a mixed pressure turbine for driving a three-high 18-inch roughing mill. The turbine is direct connected to the mill through double reduction gears. This is understood to be the first installation of its kind in the United States and the second in the world. The steam turbine in its various forms, high, mixed or low pressure, has been extensively employed for some years in central stations and in many cases has brought about considerable reductions in the cost of generating electrical energy. The low and mixed pressure turbines particularly have occupied a prominent place in the movement for the conservation of energy because they utilize heat which otherwise would be wasted in the exhaust or the condenser.

For rolling mill drives, however, the turbine did not find favor until recently, because it necessarily must operate at high speeds, and also because mill engineers have felt that its torque characteristics were not suitable for steel mill purposes. The installation at the Carpenter plant, however, indicates that any difficulties which may have surrounded the utilization of turbines for rolling steel have been surmounted. By the use of reducing gears similar to those employed on ship board, the speed problem has been solved; the gears also, in connection with suitable fly-wheels, have satisfactorily settled the torque question. It is hardly necessary to state that the installation at Reading will be watched with unusual interest throughout the iron and steel industry.

The turbines, gears and circulating pump were furnished by the De Laval Steam Turbine Co., Trenton, N. J., and the installation was designed by the Dravo-Doyle Co., Pittsburgh.

The Carpenter Steel Co. rolls tool steel and special steels for projectiles, safety razor blades, springs, etc. Its equipment includes a three-high roughing mill, together with 10-inch and 8-inch finishing mills. The three-high roughing mill, which is now driven by the turbine, previously was coupled to a 36 x 36-inch simple slide valve engine which was operated condensing, while the finishing mills were belted to a 22 and 40 x 48-inch cross compound engine. A moderate vacuum was employed.

In addition to the main power units for this mill, there were in the immediate vicinity several service and boiler-feed pumps and air compressors, the exhaust of which was partially utilized in an open heater, to heat the boiler feed water, the surplus steam escaping to atmosphere. While no data were obtained regarding the exact steam consumption when using this equipment, it was necessary that five boilers of a nominal rating of 200 horsepower each be operated continuously.

With a view of reducing power costs several alternatives were considered. The simple engine driving the roughing mill could have been replaced by a modern compound engine and a modern high-vacuum central condensing plant for the two engines might have been installed, but because of the fluctuations of load on the engines and the small average horsepower required, also because of the first cost of the equipment and the moderate economy, this scheme was not adopted.

A second alternative was the installation of a low-pressure turbo-generator operating on the exhaust of the compound engine to supply current to a motor driving the roughing mill. This did not appear attractive in this particular case, however, as it involved a large investment in turbine, generator, switchboard, transmission lines, motors, starters, etc., and nearly all the current produced would have been consumed by the roughing mill.

The third alternative considered, and the one ultimately adopted, was the installation of a low-pressure turbine to drive the roughing mill. This proposal involved the use of speed-reducing gears, a new expedient in this country, but one which had already

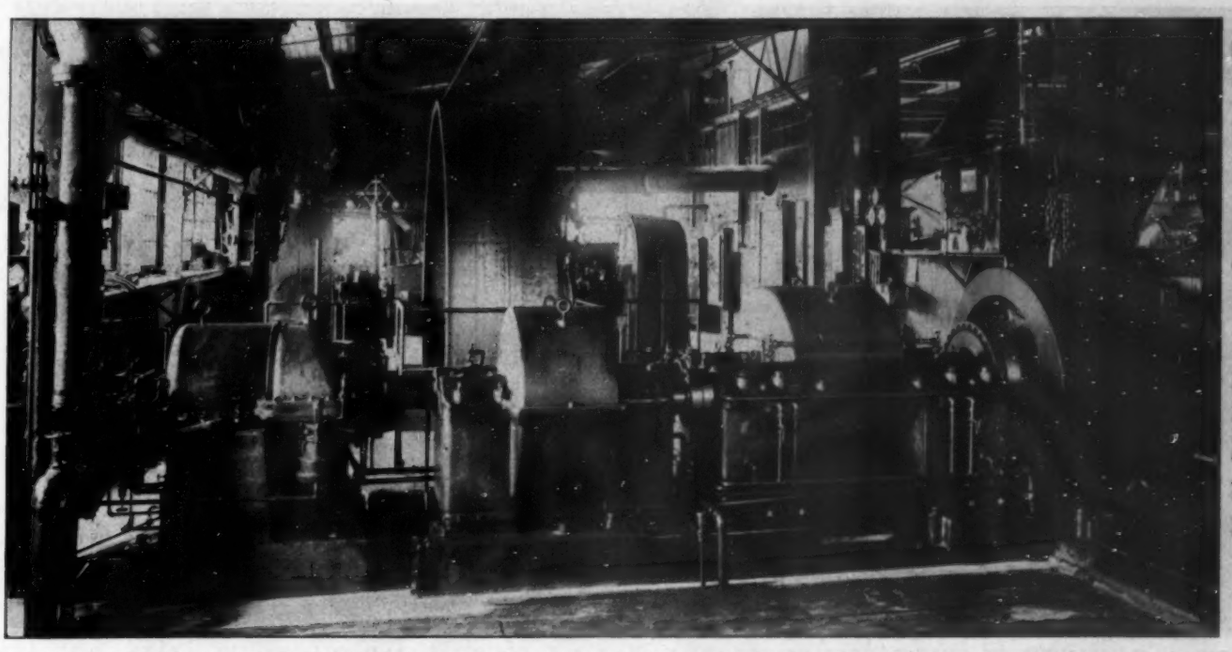


FIG. 1—MIXED PRESSURE TURBINE DRIVING ROLLING MILL THROUGH DOUBLE REDUCTION HELICAL GEAR

FIG. 2—FINISHING MILL OF CARPENTER STEEL CO.

been satisfactorily employed by James Dunlap & Co., Calderbank Steel Works, near Glasgow, where a mixed-pressure steam turbine, developing 750 horsepower, drives a three-high 28-inch plate mill. The speed reduction of the Calderbank mill is made in two steps, first from 2,000 to 375 revolutions per minute, and then to 70 revolutions per minute, by means of double-helical gears of the rigid frame type. The gear wastes, at most, it is said, not more than 1½ to 2 per cent, besides which it costs little, occupies only small space and is simple and requires little attention.

For the operation of the roughing rolls at the Carpenter plant, an average of about 350 horsepower was required at a speed varying from 60 to 100 revolutions per minute, while for the greatest efficiency and simplicity of construction a turbine of this capacity should run at about 5,000 revolutions per minute. To secure the reduction of 50 to 1, a two-reduction gear was adopted, the gear and turbine being mounted on one base plate, and the complete unit so located that the shaft of the slow speed gear is in line with the shaft of the engine which the turbine replaces. The 26-foot engine fly-wheel, weighing 47,600 pounds, and the engine shaft and bearings, were left in place. In order to avoid interruption of work while making the change and also to provide against any possible interruption of service, thereafter, the engine was left intact and only the connecting rod removed, a distance piece, which serves also as one of the flanges of the flexible coupling on the low-speed gear shaft, being bolted onto the crank disk. After the turbine was installed it was thus possible to operate it without load in order to try out the entire installation, during which period, the engine continued to drive the mill and practically no time was lost in changing from engine to turbine drive.

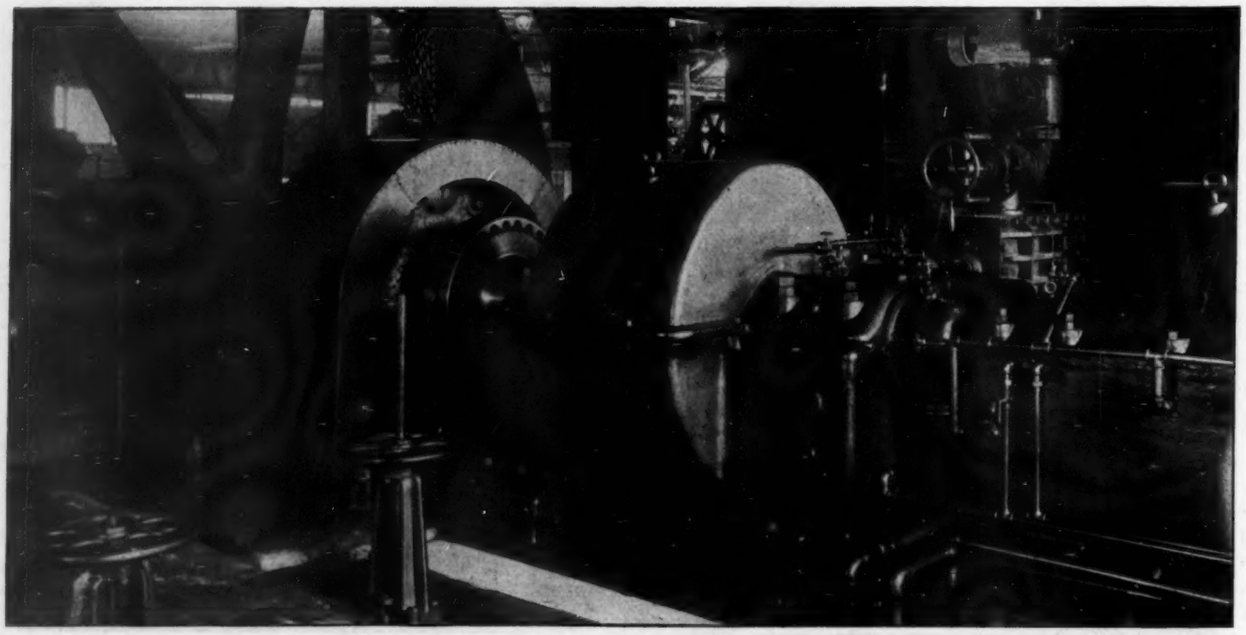


FIG. 3—CLOSE VIEW OF GEAR REDUCTIONS SHOWING FLEXIBLE COUPLING AND OLD ENGINE CRANK, DISC AND FLYWHEEL

The turbine is of the mixed flow type having separate wheels for the utilization of the high-pressure steam and is designed to operate under four different steam conditions.

When receiving engine exhaust at a pressure of three pounds gage, and when exhausting into a vacuum of 27 inches, it is to develop 350 horsepower at speeds corresponding to 70 to 100 revolutions per minute of the mill shaft, under which conditions it is to take not more than 26 pounds of steam per brake horsepower hour, as measured at the end of the second gear reduction.

It is also to carry the normal load of 350 horsepower when using steam at 120 pounds pressure and exhausting to a 27-inch vacuum, under which conditions it is to take not more than 17½ pounds of steam per brake horsepower hour.

When receiving both high and low pressure steam, and exhausting to vacuum, the turbine is designed to carry 600 brake horsepower continuously. It is also to be able to carry a load of 600 horsepower on high-pressure steam only, when the compound engine is not running. Under these conditions, it is designed to take not more than 15.7 pounds of steam per brake horsepower hour.

The turbine also is built to carry its normal load non-condensing when receiving steam at 120 pounds and exhausting to atmosphere, making it possible to inspect or repair the condenser or circulating pump without interfering with the operation of the mill.

The flexibility of operation above described was considered more desirable than the very highest steam economy. Another requirement was the ability of the turbine to start the mill without difficulty when cold, which was met very satisfactorily.

The turbine governor, of the Jahns type, is special, as shown in Fig. 4. By turning the handwheel which encircles the governor spindle the tension of the spring opposing the governor weights can be varied, providing a speed adjustment of 60 to 100 revolutions per minute at the rolls. This governor controls both the high and low-pressure throttle valves by an oil relay. The emergency governor which is located at the end of the turbine shaft, trips a latch in the case of over-speeding, which closes the emergency stop valve in both the low and high-pressure inlets and opens a vacuum breaker, which may be seen attached to the side of the turbine case in Fig. 1.

The gears are of the De Laval double-helical type with two reductions, the slow speed shaft running at 60 to 100 revolutions per minute, the intermediate shaft six times as fast and the turbine shaft 50 times as fast, or at 5,000 revolutions per minute when the rolls are running at 100 revolutions per minute. The gear teeth which are of the involute type with a 45-degree angle, are cut in rolled steel bands shrunk on cast iron centers in the case of the gears, while the pinions are chrome-nickel steel forgings. Having been very carefully cut and ground the gears and pinions are practically noiseless in operation.

All the high-speed bearings of the turbine and gears are supplied with oil from a tank placed 15 feet above the center line of the turbine, to which the oil is raised from a drain tank at the end of the turbine by a

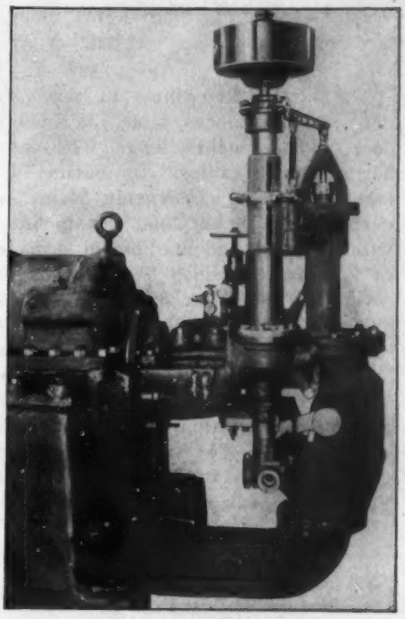


FIG. 4—VARIABLE SPEED GOVERNOR CONTROLLING TURBINE

gear type oil pump, operated by the extended governor spindle. The slow speed bearings are ring oiled.

The roughing mill is three-high and consists of two stands of 18-inch rolls. It is manually operated, two men being employed on each stand. Due to the fact that the finishing mill cannot take high carbon steel as fast as the roughing mill can supply it, only one billet is usually in the roughing mill at one time, but when rolling low carbon steel, two billets are in the roughing mill at once. When handling the one billet no speed variation is perceptible on the tachometer which is permanently attached to the 600 revolutions per minute shaft, while when handling two billets the speed drops approximately 2 per cent. The fact that there is no drop of speed with one billet in the mill shows that the heavy flywheel is not required for power storage under such conditions. By setting the governor for a greater drop in speed before the high-pressure valve opens, the power storage capacity of the flywheel can be utilized to any extent desired, and unnecessary use of high-pressure steam is thereby avoided.

The exhaust pipe from the compound engine is fitted with a cross, one branch leading to a multi-port back-pressure valve, while another runs to the condenser which serves the low-pressure turbine. The turbine receives its low-pressure steam supply through a branch from the latter line. The third branch from the cross runs to the turbine driving the circulating pump located in the boiler room, to which reference will be made later.

The compound engine, operating non-condensing, ordinarily supplies steam under 3 to 3½ pounds back pressure to the turbine. The roughing mill, however, is not required at certain times, the steel being taken directly to the finishing mill, when the valves between the engine exhaust and the turbine and between the turbine exhaust and the condenser can be closed and the valve between the engine exhaust and the condenser opened, permitting the engine to be operated condensing.

On the low-pressure supply line to the turbine is placed a special receiver steam separator. In order to insure dry steam, a coil of 1-inch copper pipe, inserted in the 12 feet of 10-inch pipe between separator and turbine, is kept filled with live steam and drained by a steam trap. Adjacent to the low-pressure throttle valve of the turbine is a multi-port flow valve, designed to prevent the vacuum from backing up from the condenser through the turbine into the engine exhaust line. Without this valve there is always a possibility of air being drawn in through leaks in the exhaust line and through piston rod and valve stem packings of the engine at times when there is little or no exhaust steam available. Such air would interfere with the operation of the condenser.

The condenser which is of the Schutte-Koerting multi-jet type, is located just outside of the engine room, and is protected by a multi-port atmospheric relief valve. With a water temperature of 72 degrees Fahr., the condenser maintains a vacuum of 28.2 inches, with the barometer at 29.78 inches. In view of the fact that there was a surplus of exhaust steam for operating the circulating pumps, and

also the desirability of a simple, reliable condenser, this type of condenser was considered more satisfactory and efficient than a condenser requiring air pumps.

The circulating water for the condenser is supplied by a centrifugal pump driven by a mixed-flow geared turbine. This turbine is of the velocity-stage type with two sets of nozzles and is designed to operate either with steam at 120 pounds gage or with steam at three pounds gage, exhausting to a 27-inch vacuum. It exhausts through a 10-inch pipe to the same condenser which serves the main unit. The pump can be started noncondensing, and will carry full load with high-pressure steam alone, thus providing both for starting the pump before the condenser is in operation and also for carrying its full load without taking low-pressure steam. The pump is designed to supply 2,200 gallons per minute against a 65-foot head and is fitted with an extended base, upon which an additional pump will later be mounted for other purposes. The water supply is taken from the Schuylkill river. The speed reducing gears permit both turbine and pump to run at their respective best speeds for economy, 5,000 revolutions per minute for the turbine, and 1,500 revolutions per minute for the pump.

Surplus exhaust steam not used by either turbine passes to the open feed water heater, which also receives the exhaust from pumps, air compressors, etc.

The entire cost of the installation, consisting of the turbine, reduction gear, condenser, piping, circulating pump, valves, etc., erected complete, was approximately $25,000, and due to the economy secured through its use, it has been possible to reduce the boilers in operation from 1,000 horsepower to about 600 horsepower. This indicates a saving of approximately $15,000 per year.

## Oil-Fired Bloom-Heating Furnace

*By F. A. Churchill Jr.*

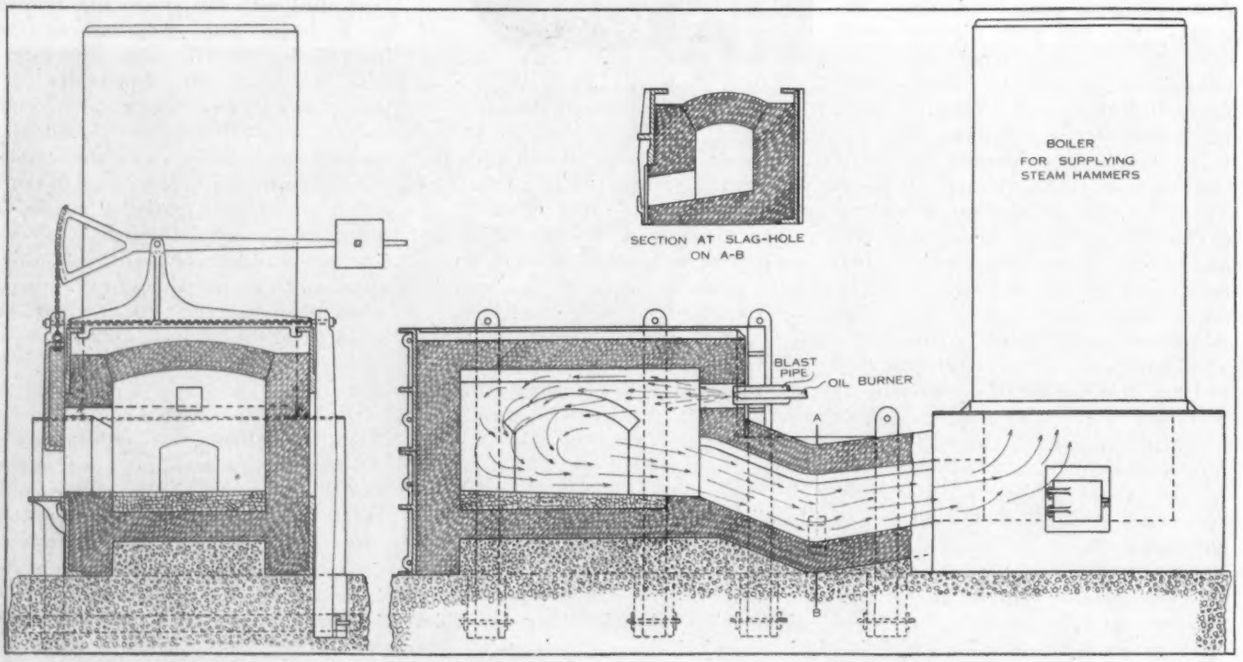
An interesting bloom-heating furnace operated in conjunction with a waste heat boiler that supplies steam for operating forging hammers, is to be found in the forge shop of the Washington Iron Works Co., Seattle, Wash., a plant devoted to the manufacture of hoisting and logging engines and machinery.

The inside dimensions of the furnace are 48 inches wide, 36 inches deep and 72 inches long. The arch has a 48-inch radius. Its outside dimensions are 66 inches wide, 54 inches deep and 90 inches long. It is lined with fire brick and the bottom is made of a quartz, whose composition is given as 99 per cent silica. It is shipped from a point about 25 miles north of Spokane, Wash. The thickness of the furnace roof is 12 inches. The average life of the lining, under continuous operation, is approximately six months. The amount of heat generated is roughly, 2,600 degrees Fahr. California crude oil is burned, five barrels, at 75 cents a barrel, being consumed during a 10-hour run.

The boiler is 66 x 120 inches. It is of the return tubular type set on end and is not one of the company's logging type boilers, though designed and made in the works. The steam pressure is 150 pounds, and it is rated at 75 horsepower. The oil burner is of the usual commercial type. The buck stays are cast iron. The height of the stack is 16 feet and its diameter 22 inches. Owing to inability to secure a pyrometer for the tests, it has been impossible thus far to obtain the temperature of the gases in the flue immediately after they leave the furnace and again immediately after they leave the boiler. The efficiency of the arrangement, however, is said to be satisfactory.

The feature of the combination is that the oil burner is placed immediately over the outlet flue and the gases impinge against the opposite wall. This looped flow of gas increases the furnace's heat extracting ability.

The Independent Pneumatic Tool Co., Thor building, Chicago, has issued a new four-page circular describing various types of pneumatic tools suitable for use in foundries, machine shops, etc. Riveting hammers of various sizes are illustrated, together with drills, air hose, etc. Particular attention is given a description of a long stroke, one-piece riveting hammer equipped with a safety trigger which is said to prevent accidental discharge.




SECTIONAL PLANS OF BLOOM HEATING FURNACE

# Improved Recording Instrument

## Description of an Electrical, Long Distance Transmitting and Recording System Using Induction Balance Movements

INSTRUMENTS for making continuous graphical records of pressure, speed, temperature, etc., are now considered essential in every well organized steel works, in order that the superintendent or other executive may be thoroughly informed regarding operating conditions. Up to the present time, however, it has been necessary to install the recording instrument at the point where the observation is made, that is in the boiler room, at the switchboard, etc. Through an improvement recently placed on the market by the Bristol Co., Waterbury, Conn., it now is possible to have the recording instrument located at any convenient point, in the superintendent's office or elsewhere, at any distance from the place where the measurement is made. It is believed that the application of this improvement will considerably extend the use of recording devices in large industrial establishments where the various departments are widely separated.

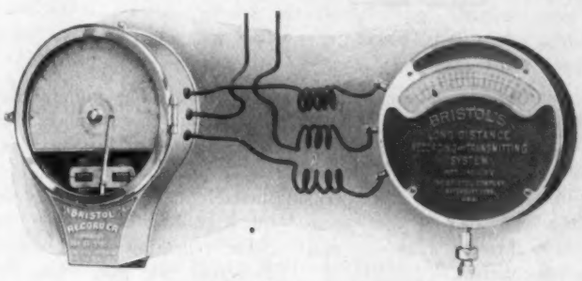



FIG. 1—STANDARD TRANSMITTING AND RECORDING SET

In these instruments Bards' patent long distance induction balance movements are employed as specially developed for this purpose by the Sangamo Electric Co. Fig. 1 shows a standard unit of these transmitting and recording instruments including the transmitting indicator for installation at the point where the pressure or temperature, etc., is measured, and the receiving recorder which is installed at the remote point where it is desired to have the record produced. The two instruments are shown connected by three wires one of which is connected to a source of alternating current, as for instance, a lighting circuit.

This long distance system is said to be particularly well adapted for use under ordinary operating conditions because of its simplicity of construction. There are no sliding or make and break contacts employed, and the effects of variation of temperature or resistance along the circuit are claimed to be negligible. The recording instrument may be installed many miles distant from the measuring and transmitting device. For instance, if 110 volts and No. 14 copper wires are used, the recorder can be installed 40 miles or more from the transmitter. The transmitting device is mounted in a moisture proof case, and can be installed outdoors if necessary, as for instance, on the bank of a reservoir. Although this equipment is only now being put on the market in commercial form it is not untried as preliminary models have been in service for more than four years. One of the first outfits was installed at Peoria, Ill., to indicate at the central station the steam pressure at the end of a steam heating main. It is said to be giving satisfactory results.

The fundamental principle of the Bristol long distance transmitting and recording system is that of the induction balance. The transmitting instrument and the receiving instrument are each equipped with two pairs of coils arranged to swing in a horizontal plane over iron cores. Fig 2 shows the interior of one of the transmitting instruments. In this instrument the helical form pressure tube and the electrical transmitting device are shown in the operating position. Figs. 3 and 4 are detailed front and top outline diagrams of the transmitting device which is similar to the receiving device. The complete outfit consists of two pair of mechanically balanced solenoids arranged to swing horizontally back and forth over the ends of soft iron cores and connected in parallel to an alternating current circuit. One pair of the solenoids is used for the transmitting instrument, the other pair for the receiving instrument. The front view, Fig. 3 of the transmitter shows one pair of the solenoids *A* and *B* on spools connected together and supported on a shaft, the ends of which rest in jewel bearings at *G* and *F* and are free to swing back and forth over laminated soft iron cores *C* and *D*. The top view, Fig 4 shows the solenoids *A* and *B* of the transmitter in section and by the dotted outline the position to which the solenoids may swing also is indicated. A similar pair of balanced solenoids is placed in the receiving recorder or indicator at the distant point. When the solenoids *A* and *B* of the transmitter and receiver are connected in parallel and the transmitter coils *A* and *B* are held in some certain position by the operating mechanism of the water level gage, pressure gage, thermometer, etc., located at *E*, the relative amounts of current flowing in solenoids *A* and *B* will depend on their positions on the iron cores *C* and *D* due to the inductive effect. At the receiving instrument the other pair of solenoids are mechanically balanced and free to take an angular position which will be the

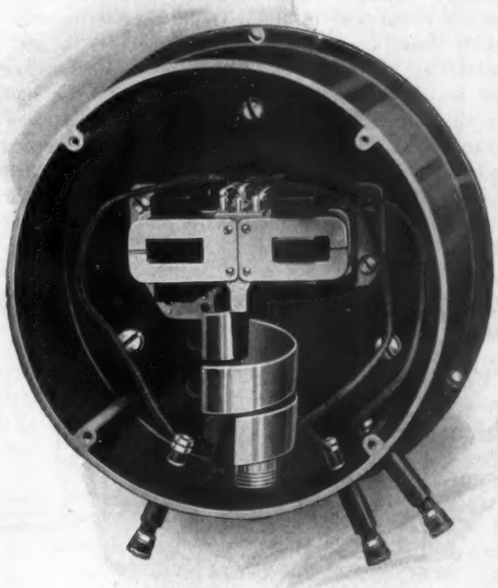


FIG. 2—INTERIOR OF INSTRUMENT

same as that of the transmitter, since the flow of current will be the same in the corresponding solenoids of the receiver as in the transmitter. If the angular position of the pair of solenoids at the transmitter is changed by the operating mechanism thus moving one of the solenoids off and the other on to the iron cores, increasing the inductance in one solenoid and diminishing it in the other, the flow of current will be proportionately increased in one coil and diminished in the other. The variations of current at the distant receiver will correspond with the variations at the transmitter, and cause the pair of solenoids of the receiver to seek a position of balance which will be the same as that of the solenoids of the transmitter.

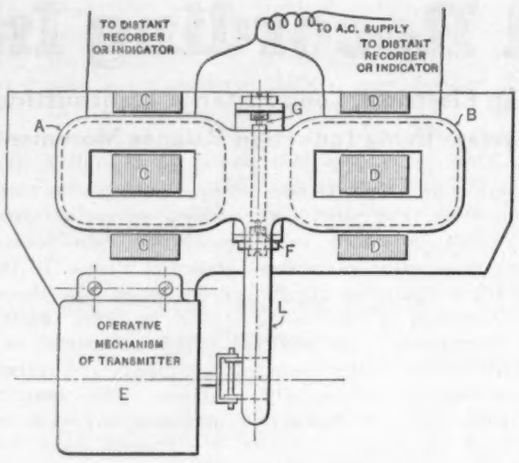



FIG. 3—FRONT VIEW OF MECHANISM

In the transmitter, the operating mechanism is linked directly to the balanced solenoids by means of an arm *L*. In the receiver the recording pen or the indicating pointer is connected to a similar arm through a simple, and practically frictionless multiplying mechanism.

## Manganese Steel and the Allotropic Théory

*By Albert Sauveur*

At the New York meeting of the American Institute of Mining Engineers in February, 1914, Professor Hopkinson and Sir Robert Hadfield presented an important paper entitled, "Research with Regard to the Non-Magnetic and Magnetic Conditions of Manganese Steel." Any contribution on manganese steel by its discoverer necessarily carries with it much weight and is entitled to serious and close consideration. The momentous discovery of that alloy by Sir Robert Hadfield some 30 years ago was the signal for great activity in the field of alloy steels; and the remarkable results obtained in the last two decades probably constitute the most important modern advances in the metallurgy of steel.

The authors of the paper referred to above are unable to reconcile with the allotropic theory the interesting results obtained by them in heat treating manganese steel. When they speak of the allotropic theory, however, I understand that they have more especially in mind the existence of beta iron. A careful consideration of the experimental results reported and discussed by the authors leads me to believe that on the contrary they can be very satisfactorily explained in terms of allotropy and that, in the light of our present knowledge, they cannot be accounted for in any other way. The physical properties of non-magnetic manganese steel described by the authors are those pertaining to iron-carbon alloys in which iron is present in the gamma condition, or, in other words, to austenite. The metal is then characterized by great tenacity and ductility and low elastic limit, while its hardness, mineralogically speaking, is not excessive, but of a special kind termed "tough hardness" by the authors. Even when subjected to the restraining influence of a large amount of manganese and of considerable carbon, however, relatively rapid cooling is necessary to produce austenitic manganese steel free from beta and alpha iron. On every slow cooling from a high temperature, as indicated by the authors, manganese steel becomes, to some extent, magnetic, because in accordance with the allotropic theory such slow cooling permits the formation of some beta and alpha iron. The mineralogical hardness of the metal is then, as it should be, somewhat greater. Non-magnetic, and, therefore, austenitic, manganese steel, while very much more stable than hardened, high-carbon steel, is nevertheless in an unstable condition, as evidenced by the fact that relatively quick cooling is required for its production.

On reheating (shall we say tempering?) manganese steel, therefore, we may logically anticipate a partial transformation of gamma iron into beta and, possibly, into alpha iron—and, indeed, the authors show that reheating non-magnetic, austenitic manganese steel for a long period of time to some 500 degrees Cent. or higher causes the return of considerable magnetism and greatly increased hardness. While they consider this occurrence fatal to the allotropic theory, it appears to me, on the contrary, to carry with it a striking confirmation of the correctness of that theory. If there were no hard allotropic modifications of iron *between* the soft alpha and moderately hard gamma varieties, the transformation taking place in reheating manganese steel could only imply the formation of some alpha iron and, therefore, *decreased* hardness. The fact that the treated steel becomes magnetic also points to the formation of some alpha, together with beta iron. This is also consistent with the allotropic transformation observed in carbon steel when we find that whenever a notable quantity of beta iron is formed, causing hardness, some alpha iron also forms, imparting magnetism to the metal; hence the hardness and magnetic properties of hardened carbon steel. It does not seem possible, in the presence of carbon at least, to produce much beta iron to the exclusion of alpha iron. These two allotropic varieties probably form isomorphous crystals which are both hard and magnetic. The paper details some interesting experiments from which the following deductions are made: It appears that manganese steel of the Hadfield type may occur under three distinct conditions: (1) as austenitic steel mixed with a considerable amount of free carbide, a condition which is produced by slow cooling from a temperature exceeding 700 degrees: (2) as austenitic steel practically free from segregated carbides, a condition produced by rapid cooling from a high temperature and (3) as martensitic or possibly austenito-martensitic steel, a condition

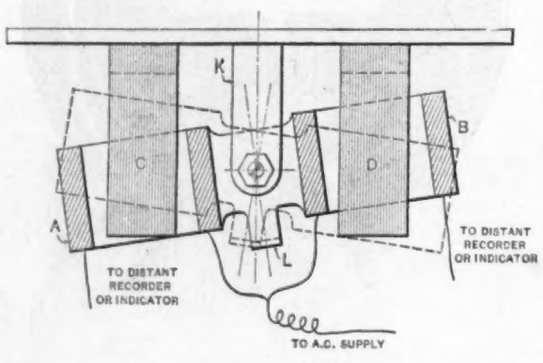



FIG. 4—TOP VIEW SHOWING IRON CORES AND MOVABLE SOLENOIDS

Abstract of paper presented at Pittsburgh meeting of American Institute of Mining Engineers, Oct. 8-10, 1914.

(*Continued on page* 1014*c*)

# Business News from the Capital

**Attorneys Argue Concerning Ore Rate From Lower Lake Ports—Hearings Will Probably Begin in Ten Days—United States Steel Corporation Attacked**

Washington, Nov. 24.—Hearing relating to the ore rate structure from lower lake ports to Ohio, West Virginia and Pennsylvania furnaces probably will begin in 10 days or two weeks. Scheduled to start last Thursday, attorneys for the railroads and for the shippers were unable to agree as to the method of procedure, and Examiner J. W. Carmalt of the Interstate Commerce Commission, following an hour's squabble between the attorneys, announced that he would postpone the hearing and submit the question of procedure to the commission. Promise was given that those interested would be advised promptly as to the decision of the commission.

It developed from the beginning that the shippers wanted the railroads first to assume the burden of proof as to the entire rate adjustment in the territory affected. The railroads strongly opposed the idea, although they expressed a willingness to proceed immediately by assuming the burden to justify the increased rate to Wheeling, W. Va. This rate was advanced from 60c to 88c per ton, following the decision in the original complaint of the Pittsburgh Steel Co., Pittsburgh, against the 96c rate to Pittsburgh. By the decision, it was held that the Pittsburgh rate should be no higher than the Wheeling rate, and as a result both Pittsburgh and Wheeling were given the 88c rate.

It was the contention of the shippers, and apparently was approved by Examiner Carmalt, that the proceeding as to a general investigation, was instituted by the commission itself and it rested with the carriers to open the case and put in their testimony as to the reasonableness and non-discriminatory character of the rates. Moreover, Attorney Wade H. Ellis, of the law firm of Ellis & Donaldson, this city, representing the Wheeling Steel & Iron Co., and the Pittsburgh Steel Co., maintained that, inasmuch as the Wheeling rate represented an advance, the carriers must justify it and as they would have to proceed in that matter it would prevent duplication of testimony if the carriers assumed the entire burden.

It was strongly urged by Attorney Richard Jones, general counsel for the Republic Iron & Steel Co., representing all of the independent iron and steel interests of the Mahoning and Shenango valleys of Ohio, and Pennsylvania, respectively, that the case be taken up at once. The companies he represented have had before the commission for two and one-half years a complaint against a rate of 56c per ton to the valleys.

Mr. Ellis took occasion to direct a rather sharp attack at the United States Steel Corporation. It had not joined in the general protest for "very obvious reasons," he said. Then he added that the Corporation owns its own railroad serving the Pittsburgh district, with facilities for handling its own ore, thus making it independent to a large extent of the rates made by the trunk lines. "So far as it received ore from the trunk lines," he continued, "it had secured various concessions in the form of divisions out of the rates, furnace allowances, remission of demurrage and per diem claims, which gave it a rate considerably less than that stated in the tariff." In addition to this, it was stated, "the interrelation between the Corporation and the trunk lines was such that the Corporation could not be expected to voice a protest against the rates when it had, through its representatives, been in the inner councils where its influence was felt not only in the fixing of ore rates, but of all other rates in which the iron and steel manufacturer would be interested."

## Privilege Not Extended

Washington, Nov. 24.—An opinion was handed down last week by the Interstate Commerce Commission holding that there is no peculiar requirement incident to the pressed steel car industry, as is the case in the bridge and structural steel industry, which necessitates the extension of the fabrication-in-transit privilege to the pressed steel car industry with respect to the steel underframes for railroad cars. The complainant, the Middletown Car Co., Middletown, Pa., sought the extension of the fabrication-in-transit privilege applicable to bridge and building steel and to steel entering into the underframes for railroad cars, so that privilege could be enjoyed at Middletown.

Structural iron and steel used for bridges and buildings, the opinion said, is of necessity fabricated at mills far removed from the location of the bridge or building, and it is essentially inexpedient to set up the necessary machinery for such fabrication at the location of the bridge or building. This was held to warrant the extension of the privilege to this particular industry.

"There is no reason," the opinion continues, "why the underframes for steel cars can not be made at the plant at which the other parts of a car are constructed and assembled, and in practice it is customary for this to be done."

## Visiting Armor Plate Plants

Washington, Nov. 24.—When they left here Sunday night, members of the armor plant investigating committee expected to complete their inspection of the three armor making plants within a week. It was considered improbable that witnesses would be summoned during the week and hearings held. No specific plans in addition to the inspection trip have been made by the committee.

Originally it was intended to hold hearings in this city before starting the trip, but for some unexplained reason this plan was abandoned and the trip determined upon immediately after the arrival here last Friday morning of Senator Benjamin R. Tillman, of South Carolina, chairman of the Senate naval affairs committee and of the investigating committee. Rear Admiral Joseph Strauss, chief of the bureau of ordnance, navy department, is secretary of the investigating committee. The remaining member, Representative Lemuel P. Padgett, of Tennessee, is chairman of the House naval affairs committee.

After inspecting the armor plant of the Carnegie Steel Co., at Pittsburgh, the first point visited, the committee will go in turn to the Bethlehem Steel Co.'s plant, South Bethlehem, Pa., and the Midvale Steel Co.'s plant, Midvale, Pa.

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The Proctor & Gamble Co., Cincinnati, will soon begin preliminary work on a new plant near Hamilton, Ontario, which will cost about $1,000,000. Five buildings will be constructed. The first structure will be 50 x 100 feet and three stories and the second will be 60 x 200 feet, four stories.

# Founders Review National Legislation

(*Continued from page 983.*)

of the department of labor, which was unmistakably announced in his initial speech before the American Federation of Labor at Seattle last November, and his pro-union sympathies since that time undeniably confirm the thoughts to which he gave utterance.

"We urge the secretary to remember that he represents all classes of labor, and that in supporting militant unionism in its efforts to secure the closed shop, he is a party to the warfare directed as much against the 90 per cent of independent non-union workmen, as against their employers. The secretary, therefore, is laying himself open to the possible charge of arraying labor against labor.

"There seems to be no change in the intent of the Iron Molders' Union to violate contracts, to order unnecessary strikes when possible, and to disregard the financial status of its members and their opportunity of securing other employment, when driven to a choice between privation, compelled by fear of vicious leaders, or honorable independent employment. Notwithstanding the marked dullness prevailing in the foundry industry, we have had five strikes, one of them involving a considerable number of men, and attended with more or less violence.

"The Iron Molders' Union is devoting itself more and more to subterranean political attacks, not only upon foundry interests, but also upon those congressional representatives, elected from manufacturing districts, who do not carry out the orders emanating from the head of the American Federation of Labor. The proper methods best suited to offset these marked political efforts are receiving careful thought on the part of your officers. We especially recommend that a more vigorous participation by foundrymen in efforts to secure broad-minded, well informed men, as state and national representatives, is vitally necessary.

"Above all things, we must make an effort to instill in the minds of the legislators, as well as of our employes, that observance of American ideals, and respect for law are the foundations upon which the commercial success of our nation has been built.

"I also urge that the field of our educational campaign be opened and extended in other channels. Many of the clergy, teachers, editors, and even manufacturers, do not fully appreciate the nature of the national conflict being waged in favor of the open shop, and do not understand at all the industrial and moral problems related thereto. A systematic campaign, national in its scope, should be undertaken, and we should utilize every available means at our command for the purpose of instructing those whose position in life fits them to act as leaders of their respective groups. A misunderstanding of the law of supply and demand, and the misconception and prejudice resulting from the lack of complete information on the part of many in the classes referred to, should be corrected and allayed. This is one of the expensive, but very necessary investments which our association should cheerfully and unanimously continue.

### Safety and Sanitation

"Last year our members were enthusiastic over the results accomplished by our committee on safety and sanitation under the capable direction of Chairman Alexander. It will interest you to know that many standards initiated by our committee have been adopted by sister associations with whom we are harmoniously co-operating. A few months ago there was organized a joint safety conference board, composed of representatives from the National Founders' Association, National Metal Trades Association, National Association of Manufacturers and the National Electric Light Association, which decided to pool their interests in the development of safety methods and the establishment of joint standards. The organization of this conference board is an initial step in developing operating efficiency through the prevention of avoidable accidents. The associations co-operating in this work represent a great variety of industries which operate normally over 5,000,000 employes, and we have no doubt that other national employers' associations will gladly join with us in the extension of this splendid work.

"Many states have passed legislation stipulating compensation for injured workmen, a policy which this association should endorse; if limitations and conditions, equitable for all concerned, are provided. I urge all members to take personal interest in the formation or correction of compensation laws in their various districts, and thus give state commissions the opportunity of weighing the suggestions of practical, well-informed employers against those of the always energetic representatives of the unions."

A. E. McClintock, commissioner of the association, in his annual report, pointed out that there had been only five strikes at the shops of the members during the year. The last six months have been comparatively free from labor disturbances and the reason for this he assigned to business conditions which have not been favorable to agitation and strikes. He cautioned the members not to be lulled into any sense of false security, to the extent of relaxing their vigilance, thus making it easy for the radicals to foment discontent immediately following the revival of trade.

The termination of the Erie strike on March 3, this year, was by far the biggest victory scored by the association. On that date, the International Molders' Union gave up the fight, which had continued for 15 months and which involved an expenditure of over $200,000 in strike benefits. At the time this action was taken, approximately 360 molders and coremakers and 130 apprentices were receiving strike benefits and were without employment to shift for themselves.

The report of the commissioner concluded as follows:

"We certainly have no reason to believe that our members will not again be confronted with the old demands of union recognition, with all its limitations of output, restrictions on employment and machinery, and other attendant evils.

"To the union official or the paid agitator, recognition by the employer is of supreme importance, and the one thing desired above all others. Recognition in the molding industry means closed shop, and closed shop means prompt payment of union dues as a condition of employment. Nearly every member of this association has had the experience one time or another of trying to operate a union shop in conformity with the rules and regulations as formulated by the Molders union. The sensation of furnishing the payroll at regular intervals, while the walking delegate of the union ran the business has also been experienced. By reason of such most unsatisfactory experiences, this association was founded, and has since been maintained."

Secretary J. M. Taylor referred at

length to the investigation of the affairs of the association by the Federal Industrial Commission and he reported that all of the records of the society were placed at the disposal of the investigators. A large part of his report was devoted to a discussion of the need of promoting educational work on the trade union question. The trend of general sentiment in favor of the union is still radical, as indicated by the reports of the various state and federal commissions on industrial problems, which have been dominated, more or less, byt trade union representatives. Recently an attempt was made to include a course in *unionism* in the Chicago public schools under the guise of *collective bargaining*, but Mr. Taylor said that the reason the movement was not successful was due to the opposition of a member of the Chicago board of education, who at one time had been a union workman.

### Labor Legislation

"The Political and Social Significance of Recent Labor Legislation," was the subject of an address delivered by Marshall Cushing, Washington correspondent of the association. In the passage of the Clayton bill he directed attention to the subservience of some of our representatives and senators, to organized labor.

Walter Drew, commissioner of the National Erectors' Association, gave an address on the work of the United States Commission on Industrial Relations. The original appointment of the commission, he said, was due to a petition sent to the president by certain reformers immediately after the McNamara expose, who believed that the violence employed by the union men must have had its root in unjust or unfair practices on the part of the employers. It is of interest to note, said Mr. Drew, that while the membership of the commission, as originally arranged, provided for three representatives of labor, three representatives of employers and three neutral representatives, all but two out of the nine members of the commission were known to be in favor of the closed shop.

The early hearings, he said, showed the trend of the commission's purpose, and employers who submitted themselves for questioning were subjected to sarcastic and, in some cases, rude treatment. For this reason, it became very hard to induce employers to appear before the commission. It later was decided, however, that it would not do for the employers to lose the opportunity of presenting their case. As a result, a large number of employers in various cities were prevailed upon to appear as witnesses. These employers, altogether, submitted a very strong case, showing conclusively the evils of the closed shop system, and proving that the shops which are most prosperous and which pay the highest wages are open shops. The open shops also show the largest production. By the testimony of employers, said Mr. Drew, many questionable practices of the unions were bared. For instance, the testimony showed that it was the custom of the bricklayers' union in San Francisco to exact one-half of 1 per cent of the contract price of all buildings in which brick was used as a material of construction.

The testimony of the employers, said Mr. Drew, has been of such a nature as to change the opinions of certain members of the commission, and it is believed that body will submit a much more conservative report than originally was hoped for. The commission, he said, has decided not to make any findings until it has examined representatives both of labor and employers, with a view to detertion that will be recommended.

George F. Monoghan, general counsel of the association, discussed very forcefully the present trend of legislation, both state and national. He greatly deplored the success which has attended efforts to pass radical and dangerous class laws, some of which, he said, seriously threaten the right of property. In this connection he called attention to the recent constitutional changes which were effected in Ohio, by means of which all kinds of radical labor legislation have been rendered possible. The unfortunate part in the adoption of these changes, he declared, was that they cannot be accepted as the will of the people, since in the election only some 25 per cent of the total electorate of the state voted. The adoption of the changes, therefore, and the bad laws which they render possible are due to negligence on the part of those who have most to lose from them.

If the labor union leaders, to whom legislators lend such an eager ear, said Mr. Monoghan, represented a majority of the workmen of the country, employers would be glad to give their efforts and desires more consideration. Statistics, however, show it to be a fact that there are only some 2,000,000 union men in the country, as compared with a total of 30,000,000 unaffiliated workmen. It, therefore, is necessary simply, but effectively, to impress this fact upon our legislators. Each employer, he said, is able to control, not by forceful means, but by intelligent argument, from a few to many hundreds of votes, and by effective co-operation in this manner a total of votes could be rolled up which would carry any election.

### Political Activity of Employers

He warned employers that they must become more active in politics. At present, he said, it is the practice to write or telegraph protests in regard to certain bills to legislators. A better method in preventing radical and harmful legislation is to secure the election of the right men and then impress on them what their constituency expects in the way of law-making. A vigorous exhibition of the employers' power to influence votes, said Mr. Monoghan, will do more to prevent harmful legislation than any number of telegrams, letters and petitions.

Mr. Monoghan alluded to the proposed employment agency bill, which has been drawn up by the United States Commission on Industrial Relations, as one of the most vicious laws which ever has been proposed. To illustrate his opinion of its provisions, he declared that in comparing this bill with the proposed anti-injunction laws, the latter would prove more acceptable from the employer's point of view. The law, he said, proposes that

## The Business Outlook

*As Seen by W. H. Barr, president of the N. F. A.*

*"Kernels of real prosperity are coming from beneath the roughened surface of perplexing business uncertainties. Each day offers a new problem, but the basic conditions of the country are good. Tremendous crops and many manufactured products are finding markets, and the readiness with which business interests have satisfactorily met the demoralizing effects due to the European war is a matter for national congratulation and a tribute to the fundamental soundness of our commercial conditions. There are deep and substantial indications of early financial relief when credit and funds will be available for the redevelopment of extensive manufacturing.*

*"It is hoped that the Interstate Commerce Commission will recognize the necessity of granting to the eastern railroads the relief to which they seem properly entitled. This will make it possible for the railroads to provide safe and efficient transportation equipment, solve economic difficulties, revive their disturbed credit and strengthen the declining value of their securities."*

bureaus be established all over the United States, which, under the direction of the secretary of commerce and labor in Washington, would have jurisdiction over every manufacturing plant which has a labor agent, and over everybody who has anything to do with the hiring of labor. The records of all plants and individuals coming within the purview of the act would be open to inspection. The radicalism of the bill, he said, is illustrated by the section which provides that every labor agent using a contract of employment must submit this contract to the government labor bureaus, and must accept any amendments or changes which are ordered.

### Clayton Bill a Political Sop

Discussing the effect of recent federal legislation upon labor combinations, James A. Emery, counsel for the National Council for Industrial Defense, characterized the Clayton bill as a political sop thrown to a demand without justification, reflecting without cause upon the conduct of courts, the authority and respect for which it lessens. Mr. Emery's address follows, in part:

"The so-called Clayton anti-trust bill became law Oct. 15. It does not deal exclusively with labor combinations, but those actions which do are proclaimed by the labor chiefs to be the culmination of years of effort to incorporate into federal legislation their familiar doctrines respecting injunctions, contempts of court and the exemption of labor combinations from the Sherman act.

"Many statements which were made during its legislative consideration and which were pertinent to the bill as it was reported to the House, or even as it was first passed by that body, do not apply to the measure finally adopted. The exaggerated claims advanced in labor quarters respecting the effect of the new legislation are no doubt due in no small part to the failure of their makers to realize the difference between the House bill and the law.

"If Congress intended to exclude labor combinations from the anti-trust law, it is obvious that it must have intended to modify or amend the original Sherman act, but this both the House and Senate Committees on the Judiciary emphatically disclaim in the report which accompanied this bill. Moreover, the debates of the House disclose that the Judiciary Committee having charge of the bill refused the request of representatives of the American Federation of Labor to amend section 6 of the bill by substituting the words 'shall apply to' for the words 'shall be construed to forbid the existence or operation' adopted.

"Labor organizations not only have not been exempted from the prohibitions of the Sherman act, but the remedies which private individuals have against them for violations of it have been very considerably enlarged. The right to triple damages for injury suffered through any violation of the Sherman act, conferred by the seventh section of that act, is expressly reiterated in the fourth section of the Clayton act, and from none of these provisions of the new law are labor combinations exempt.

"The provisions relating to contempts of federal courts are contained in sections 21 to 25, inclusive. The first conclusion which one draws from their consideration is that the contempts to which they are applicable are so limited in number that it is difficult to find any recorded cases to which, had they always been the law, they would with certainty apply. Congress is familiar with the fact that no court, state or federal, has sustained the power of the legislature to deprive a court of the power of self-defense, or the right to be the sole judge of contempts of its authority, without referring the issues of fact to a jury or other tribunal.

"The power of the court to inflict penalties for contempt, heretofore confined to either the assessment of a simple fine or imprisonment, is now extended by section 22, so that a person convicted of contempt in a labor or other case may not only be imprisoned for six months and required to pay a maximum fine of $1,000 to the United States, but he may be further fined whatever sum the court determines to be equal to the damage caused to the complainant or any other party, and if he fails to pay such fine, he may be imprisoned until he does.

"I would not have it understood that I believe the legislation to be either wise or necessary, or that I am unaware of ambiguous phraseology which invites litigation. In two applications for injunctions in labor cases made since this law became effective, one in St. Louis, the other at Indianapolis, the federal court found no merit in objections predicated upon it, but undoubtedly occasions will constantly arise requiring its adjudication. In the meantime, although I see no reason to believe that serious legal injury will be accomplished in the enforcement of the provisions discussed, as the courts under well accepted principles must interpret them we must not belittle the moral injury of this enactment."

The defects and inequities of the New York State workmen's compensation law were pointed out in an address by C. A. Chase, president of the Syracuse Chilled Plow Co., Syracuse, N. Y., and president of the New York Association of Manufacturers. Mr. Chase characterized the New York law, which has been in effect since July 1, 1914, as "the most radical compensation law in the United States" if not in the world. Forty-two groups are specified in the act as "hazardous employments" and the commission which administers the law has ruled that all persons in a plant mentioned in these groups are covered. This has raised considerable confusion and no one knows positively who comes under the law until the Court of Appeals has passed upon each case, Mr. Chase said. The effect of this specifying of certain employments excludes a great many employers and puts the burden mainly upon the manufacturers. The law provides that an employer is liable for compensation in every accident regardless of cause unless it be shown that it be due to intoxication or drunkenness. The speaker pointed out that the chances for proving such causes was very remote which practically means that the employer must pay compensation for every accident regardless of cause. No limit to the amount of the medical or surgical attention to be furnished is made though the period is fixed as 60 days.

Under the provisions of the law as it has operated to date, Mr. Chase says it has shown that a workman who has a large family of children is a greater risk than one who has none; and the same is true in the case of a married man against a single man. It tends to relegate the older employes to an inferior and less remunerative position. So many claims have been filed that the commission is far behind in its work and the workmen are complaining of the delay in receiving compensation.

Mr. Chase contended that any law such as the New York act which injects a third party between employer and employe "is a step backwards in the world's progress." "We do not," he said, "object to submitting our settlements to the commission for their final approval, but we must emphatically protest at being prohibited from looking after the welfare and best interests of our workmen."

### Foundry Hazards

"Foundry Hazards and How to Guard Against Them" was the title of an extremely interesting address delivered by Magnus W. Alexander, of the General Electric Co., West Lynn, Mass. This was along the line of Mr. Alexander's talk at the Chicago convention of the American Foundrymen's Association. Since that

time, he has developed several new safety devices, which include a respirator for the use of sand blast operators, and a helmet for the use of arc welders.

### The Colorado Strike.

"The Coal Strike and Rebellion in Colorado," was the subject of a stirring address delivered by Major Edward J. Boughton at the annual banquet held at the Hotel Astor, Wednesday evening. He traced the strike from its inception and told in a narrative style and convincing manner of the efforts that had been made to establish peace between the contending factions. At the request of the governor, the armed guards and strikers delivered their arms to the state militia. This procedure, however, was a farce, as the miners turned over only a few guns of obsolete type, the remainder having been hidden for future use. He referred to the Ludlow affair and its misrepresentation to the press of the country. The uprising of union labor throughout the country was urged by the officers of the Mine Workers' union and for a period a reign of terror prevailed through the strike region.

At the beginning of the strike, he said there was general sympathy for the miners throughout Colorado, but a revulsion of feeling has come about and at the recent elections, men were elected to office who are opposed to the tactics of the strikers and who will enforce the state laws to maintain order throughout the coal mining region.

Another speaker at the dinner was Prof. Jay William Hudson of the University of Missouri, lecturer of the Massachusetts Peace Society. He spoke in support of President Wilson's peace policy and attacked ex-President Roosevelt for "Militaristic" hysteria.

### ELECTION OF OFFICERS

The officers of the association for the ensuing year are as follows, Mr. Barr and Mr. Taylor being re-elected:

President:—Wm. H. Barr, Lumen Bearing Co., Buffalo.

Vice President:—C. A. Chase Syracuse Chilled Plow Co., Syracuse, N. Y.

Secretary:—J. M. Taylor, Chicago.

Treasurer:—Chicago Savings Bank & Trust Co., Chicago.

The members of the new administrative council for the various districts are as follows:

FIRST DISTRICT:—E. A. Jones, E. D. Jones & Sons Co., Pittsfield, Mass; D. K. Bartlett, Builders' Iron Foundry, Providence, R. I.; John A. Mead, Howe Scale Co., Rutland, Vt.; W. B. Leach, Hunt-Spiller Mfg. Corporation, Boston; F. C. Fromm, Manufacturers' Foundry Co., Waterbury, Conn.

SECOND DISTRICT:—Lyman P. Hubbell, Fillmore Avenue Foundry & Iron Works, Buffalo; James Eastwood, Benjamin Eastwood Co., Paterson, N. J.; Edward Norris, Utica Heater Co., Utica, N. Y.; James Flockhart, Maher & Flockhart, Newark, N. J.; H. P. Macdonald Snead & Co. Iron Works, Jersey City, N. J.

THIRD DISTRICT:—Edward Kneeland, United Engineering & Foundry Co., Pittsburgh; Stuart R. Carr, Stuart R. Carr & Co., Baltimore, C. W. Davenport, National Foundry Co., Erie, Pa.; N. H. Hiller, Carbondale Machine Co., Carbondale, Pa.; Wm. S. Hallowell, Harrison Safety Boiler Works, Philadelphia.

FOURTH DISTRICT:—W. B. Greene, Palmers & DeMooy Foundry Co., Cleveland; W. C. Slater, Bass Foundry & Machine Co., Fort Wayne, Ind.; Jos. J. Wilson, Cadillac Motor Car Co., Detroit; F. M. Mechling, Novelty Iron Co., Canton, O.; Geo. O. Rockwood, Rockwood Mfg Co., Indianapolis.

FIFTH DISTRICT:—S. B. Lafferty, Red Jacket Mfg. Co., Davenport, Ia.; J. H. Steedman, Curtis & Co. Mfg. Co., St. Louis; James F. Lardner, Rock Island Plow Co., Rock Island, Ill.; E. E. Baker, Kewanee Boiler Co., Kewanee, Ill.; W. H. Winslow, Winslow Hecla Co., Chicago.

SIXTH DISTRICT:—Theo. O. Vilter, Vilter Mfg. Co., Milwaukee; C. M. Power, St. Paul Foundry Co., St. Paul; C. A. Luster, Clyde Iron Works, Duluth; H. M. Wallis, J. I. Case Plow Works, Racine, Wis.; Chas. T. Jeffery, Thos. B. Jeffery & Co, Kenosha, Wis.

SEVENTH DISTRICT:—Geo. W. Watts, Canada Foundry Co., Ltd., Toronto; W. M. Gartshore, McClary Manufacturing Co., London, Ont.; A. R. Goldie, The Goldie McCulloch Co., Ltd., Galt, Ont.; Jno. M. Taylor, Taylor-Forbes Co., Ltd., Guelph, Ont.; W. F. Angus, Canadian Steel Foundries, Ltd., Montreal.

EIGHTH DISTRICT:—E. H. Sholar, Chattanooga Implement & Mfg. Co., Chattanooga, Tenn.; R. W. Boland, Birmingham Machine & Foundry Co., Birmingham; E. Y. Hartwell, Hartwell Iron Works, Houston, Tex.; H. W. Sanford, Sanford-Day Iron Works, Knoxville, Tenn.; W. D. Traboe, Jones & Hopkins Mfg. Co., Nashville, Tenn.

O. P. Briggs, of the H. E. Wilcox Motor Car Co., Minneapolis and former president of the association, was made an honorary member of the administrative council.

## Relief

### Must be Given Railroads, Said Underwood at Youngstown

The annual banquet of the Chamber of Commerce of Youngstown, held at the Hotel Ohio, Thursday evening Nov. 19, was of unusual interest. Owing largely to the efforts of the president of the Chamber, Joseph G. Butler Jr., there was a very large attendance of manufacturers, business and professional men.

President Underwood, of the Erie railroad, spoke on present conditions of the railroads of the country, which he said are on their knees, literally praying for relief. He said that if they do not get relief, they will soon be on their back, "And," he said, "when they are on their back, you and I will see more trouble than we ever saw before in all our lives. Not only do they need a reasonable advance in freight rates, but also relief from oppressive legislation."

Hon. Warren G. Harding, Marion, O., who, at the recent election, was chosen United States senator, spoke on the importance of restoring and maintaining an adequate merchant marine. "We Americans," he said, "are alone in the humiliating attitude of the most resourceful nation and the most efficient producers on the face of the earth, helpless to answer beckoning markets because we are dependent upon foreign carriers.

"Business is the very life-blood of material existence, and commerce is the vitalizing force, and just as it has developed and broadened, mankind has advanced, and man has stood erect, and liberty has asserted itself and opportunity widened. Men prate about the growing enslavement of commercialism. Isn't it about time to stop that bosh? This is a commercial age, and never was liberty so inspiring, never has opportunity so beckoned without discrimination, never was reward so generous and general."

President James A. Farrell, of the United States Steel Corporation, was to have spoken on the topic "The Importance of Further Developing Our Export Trade", but was prevented from attending by illness which detained him in New York. He promised to deliver his address at some future time before the Youngstown Chamber of Commerce.

Other speakers on the program included Hon. Maurice Connolly, of the third congressional district of Iowa, on "The Business Man and Politics", and Hon. Oscar T. Crosby, on problems now confronting the people of the United States. A number of other distinguished professional and railroad officials were present, including President A. H. Smith, of the New York Central lines; Vice President J. M. Schoonmaker, of the P. & L. E.; J. B. Yohe, general manager of the P. & L. E., and R. S. Parsons, general manager of the Erie railroad.

## Steel Plant Line Inquiry

Pittsburgh, Nov. 24.—Following the decision of the Interstate Commerce Commission, announced Nov. 6, allowing industrial railroads to enjoy rate allowances from trunk lines, steel plant lines in Pennsylvania have asked the Public Service Commission to determine what service must be rendered to obtain such allowances. Attorneys for trunk lines and railroads owned by various steel and other manufacturing interests presented arguments before the Public Service Commission at Harrisburg Nov. 19. The commission withheld decision.

The Interstate Commerce Commission, it will be recalled, modified the decision handed down early in the year, denying the right of industrial lines to obtain rate allowances. The modified ruling was described in the Nov. 12 issue of THE IRON TRADE REVIEW.

The Island Slag Co., of Tonawanda, N. Y., to make commercial use of furnace slag, has been incorporated with a capital of $60,000. T. H. Wickwire Jr., of the Wickwire Steel Co., Buffalo, is one of the incorporators, L. H. Hawblitz and G. A. France.

# TIPS FOR NEW BUSINESS

**Equipment needs of the Iron and Steel works, Machine shops, Foundries and other Metal Working plants**

THE past week has witnessed a further decided improvement in conditions in the eastern machinery market. There has been a large amount of buying and many new inquiries are before the trade. Most of the business, it is but fair to state, comes from concerns in this country who have booked large orders for materials for the belligerent powers in Europe, particularly for shrapnel. A number of shops already have booked shrapnel contracts, and a great many more are figuring on such contracts; in fact, this business is about the chief feature of interest in the market at present. Between the efforts of the manufacturers to fill up their idle capacity on shrapnel orders and those of the machine tool sellers who endeavor to get in touch with the plants that book the shrapnel, there is more or less excitement prevalent all the time. This foreign business, indeed, has attracted to New York a greater number of sales managers than probably ever before have been here at one time. In connection with this business, it is of interest to note that the engineers who are representing the French government in placing contracts for shrapnel, cartridge cases and other war material, are Messrs. Malaval and Compaye, who are staying at the Brevoort hotel, New York. The Raleigh Iron Works, Raleigh, N. C., which booked a shrapnel order, is figuring on a large quantity of machinery which will be ordered immediately. The General Electric Co., Schenectady, N. Y., and the Baldwin Locomotive Works, Philadelphia, are reported as figuring on shrapnel contracts. The Scoville Mfg. Co., Waterbury, Conn., has booked an order for cartridge cases. Among the large buyers during the past week were the New London Ship & Engine Co., New London, Conn., which bought about a dozen machines, and the Fore River Ship Building Co., Quincy, Mass., which bought several radial drills. a boring machine, several lathes and considerable other equipment. The latter company has some further buying to do. The Bethlehem Steel Co. has placed orders for about $200,000 worth of machine tools and will close shortly on about $300,000 more, all for making shrapnel and guns. The Standard Oil Co. is in the market for some six machine tools for the new can-making plant it is building in Brooklyn, N. Y. Only one railroad has been in the market to purchase machinery in any quantity during the week; this was the Richmond, Fredericksburg & Potomac, which bought some six tools for its Richmond shops. The Newport News Ship Building & Drydock Co., Newport News, Va., placed orders for a large boring mill and some other machinery. There have been several new inquiries for machine tools for export, notably one for 100 lathes for Italy. The American Sugar Refining Co. is buying a large quantity of equipment for its eastern plants, Jersey City and Brooklyn, which it is extending. Other sugar companies also are in the market.

At Pittsburgh, builders and sellers of machine tools and rolling mill equipment are interested in several industrial projects being undertaken in the Greater Pittsburgh district. The Alloy Steel Forging Co., which makes manganese steel forgings, has awarded a contract for a new plant at Carnegie, Pa., and will install some new equipment. From Niles, Ohio, comes a report that the Niles Forge & Mfg. Co. has completed plans for plant extensions. An addition will be built to the structural shops and a forge shop will be housed in a new building. McAleenan Bros. Co., Pittsburgh, is asking bids on a 100-ton sectional flange press, including pumps and accumulator, and several other inquiries of importance are being considered.

Makers of machine tools in the Chicago district have enjoyed considerable additions to their business through foreign buying, but sellers to the domestic trade find nothing to indicate improvement. Inquiry is slightly more active, but is for small business and sales do not follow in sufficient volume to make the total volume of orders exceed that of the dull season that has been prevailing for some time. Milwaukee builders are busy and foreign demand has added largely to their business. Whether this will continue sufficiently long to make their activity permanent remains to be seen. The railroads are inquiring somewhat more freely for equipment for shops, but have not begun to buy.

In Cincinnati, a peculiar incident has developed in the machine tool market, in that an inquiry for 100 lathes from a foreign country, presumably Sweden, could not be supplied by local manufacturers because early shipment was demanded. These lathes were to be delivered in New York, where 90 per cent of the price was to be paid, and they were then to be sent to their destination, which is being kept secret. It is thought here that they are intended for either Russia or Germany. The delivery was to be made within a few days and as local plants have exhausted their stocks, because of similar previous orders, they could not fill this one. The Cincinnati Planer Co. is operating full force after having been running on part time for several months. The Acme Machine Tool Co. is also running full force and has put on a night shift, as has also the R. K. LeBlond Machine Tool Co., the Lodge & Shipley Machine Tool Co., the Greaves-Klusman Machine Tool Co., and several others. A new demand has sprung up for heavy sewing machines for delivery to Europe which will be used to sew canvas for tents, bedding, etc. Practically all makers of lathes in this city are very busy and new orders are coming in continually, most of which are from foreign coun-

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tries. A few radial drills have also been sold for European delivery. Domestic business continues very slow and has shown no improvement since the first of the year, but foreign orders will keep the majority of local plants busy until well into the first quarter of 1915.

## EASTERN STATES

AMESBURY, MASS.—Biddle & Smart Co. will begin immediately the erection of an addition to its wood working plant on Water street.

ATHOL, MASS.—Diamond Match Co. will remove its plant to Biddeford, Me., although the date has not been announced; extra equipment will be required.

BOSTON.—F. A. Norcross has plans prepared for Esther Lewis' four-story, brick building in Washing street, to obtain store and rooms for light manufacturing; estimated cost $80,000.

PALMER, MASS. — Boston Duck Co., Bondsville, will enlarge its plant at once, by erecting a factory building.

QUINCY, MASS.—Fore River Ship Building Co. has purchased several radial drills, several lathes, a boring mill and is in the market for another boring mill and other equipment.

UNIONVILLE, CONN. — Case Mfg. Co. will erect a power plant addition.

WATERBURY, CONN.—Scoville Mfg. Co. has booked a contract for manufacturing cartridge cases.

PROVIDENCE, R. I.—W. LeRoy Gardiner will erect a five-story warehouse on Fountain, Clemence and Worcester streets, from plans prepared by F. P. Sheldon; building will be occupied by the R. L. Green Paper Co.

BROOKLYN.—Standard Oil Co. is in the market for six or seven machine tools for its new can-making plant in Brooklyn.

BROOKLYN.—Krantz Mfg. Co. electrical machinery, appliances, has been incorporated; $7,500 capital stock; by M. Shoop, R. B. Crispell, J. Foster Dulles, 155 East Seventy second street.

BUFFALO.—Buffalo Lounge Co. will erect a $10,000, four-story, brick addition to its warehouse and factory at 567 Exchange street.

LYONS, N. Y.—Joppa Cigar Mfg. Co. will erect a two-story, concrete factory on Geneva street.

NEW YORK.—Dochterman Realty Co. will erect a $125,000 nine-story warehouse at 1922 Webster avenue.

NEW YORK.—A. R. Powley Dredging & Construction Co. has been incorporated; $30,000 capital stock; by W. Hiltebrant, F. R. and A. Ray Powley.

NEW YORK, N. Y. — Leindorf Electric Light Co. has been incorporated; $25,000 capital stock; by J. Katz, H. Traisch, E. Leindorf, 307 West 130th street.

NEW YORK.—C. P. H. Gilbert has plans prepared for addition to the 10-story warehouse of Deering, Milliken & Co. at 30-32 Varick street; addition will be in the rear of the present building at 11-17 Beach street and 2 St. John's Place; estimated cost $175,000.

SCHENECTADY, N. Y.—General Electric Co. is reported as figuring on a shrapnel contract.

SYRACUSE, N. Y.—Syracuse Lighting Co. plans the construction of a power house to cost about $7,600.

BIRDSBORO, PA.—R. T. Eastlake & Co. will erect an $11,000, three-story, brick factory building.

CHESTER, PA.—Nearsilk Mfg. Co. will erect a three-story, brick factory building on Fifth street.

ERIE, PA.—Erie Saw Co. has increased its capital from $25,000 to $75,000.

ERIE, PA.—Erie Malleable Iron Works has increased its capital from $300,000 to $1,200,000.

IRWIN, PA.—Board of education contemplates building a $75,000 high school.

GREENVILLE, PA.—Greenville Steel Car Co. has started the erection of a 90 x 400 foot addition to its plant; capacity will be increased.

HARRISBURG, PA.—Plans have been prepared by Day & Zimmerman for a group of steel, brick and concrete buildings for the Hickok Mfg. Co., to cost about $150 000.

HOLMESBURG, PA. — Plans are being prepared for a large power house to be installed at the home for the indigent.

JEANNETTE, PA.—Warehouse of American Window Glass Co. destroyed by fire Nov. 11; loss $100,000.

JOHNSTOWN, PA.—Dale Light, Heat & Power Co., will erect a $750,000 power plant at Dale, a suburb.

MUNCY, PA. — Sprout-Waldron & Co., founder and machinist, has increased its capital from $100,000 to $500,000.

NEW CASTLE, PA.—New Castle, Youngstown and Pittsburgh capital are interested in a new plant here for the manufacture of automobile tires; will use part of New Castle Iron & Steel Co. plant; W. H. Schoen and E. N. Ohl, Farmers Bank building, Pittsburgh, interested.

PHILADELPHIA, PA.—Baldwin Locomotive Works is reported to be figuring on a shrapnel contract.

PHILADELPHIA, PA.—Vilter Mfg. Co., manufacturer of refrigerating machinery, Milwaukee, and the Mechanical Refrigerating Co., Philadelphia, have leased the two factory buildings which occupy the lot, 230 x 300 feet, at Twenty-fifth and Wharton streets, this city.

PITTSBURGH. — Plant of the Babcock Lumber Co., destroyed by fire recently, will be rebuilt.

PITTSBURGH.—Copper Die Horse Shoe Co. has increased its capital from $10,000 to $50,000.

PITTSBURGH.—Williams Tire & Rubber Co. has filed a notice of an increase of capital stock from $5,000 to $300,000.

PITTSBURGH.—George W. Gerwig, secretary of the board of education, is asking bids on electrical work at the McNaugher and Latimer schools.

PITTSBURGH.—David Goldner, architect, has plans for a $150,000, four-story terra cotta hotel, store and restaurant for L. F. Hoffman at Bedford, Pa.

PITTSBURGH.—Allegheny county commissioners have awarded the contract for a steel bridge over Pine Creek to be known as bridge No. 15, to the Penn Bridge Co., for $15,980.

PITTSBURGH.—McAleenan Bros. Co., Twenty-fifth and Railroad streets, is in the market for a 100-ton sectional flange press, including pump and accumulator; W. C. McGraffic is general manager.

PITTSBURGH.—The C. M. Neeld Construction Co., Oliver building, has been awarded a contract for a 1,200-foot reinforced concrete railroad viaduct at Wilkesbarre, Pa., for $90,000; about 400 tons of steel will be required.

PITTSBURGH. — Penn Rubber Traffic Co. has been incorporated with a capital of $150,000, for the manufacture of rubber tires and sundries for automobiles; incorporators are William Boyd, W. I. N. Loft and W. F. P. Loft, of Dover, Del.

PITTSBURGH.—Sealed proposals will be received until Dec. 9 by the clerk of the Borough of West View for the construction of a tunnel, 1,550 feet long; 1,250 cubic yards inside excavating; 800 cubic yards outside excavating; 600 cubic yards back filling; 220 cubic yards concrete; 1,660 lineal feet of 12-inch D. S. and 15-inch T. C. Pipe, together with about 4,000 feet of sewer pipe.

PITTSBURGH.—Alloy Steel Forging Co., W. S. Potter, president, has awarded a contract for a 100 x 300-foot building to be erected at Carnegie, Pa., by the Riter-Conley Mfg. Co.; the company, as pointed out by THE IRON TRADE REVIEW, on Oct. 12, operates a plant at Braeburn; old equipment will be moved, and some new machinery will be purchased to increase capacity for the manufacture of manganese steel forgings.

PITTSBURGH. — Farmers' Fertilizer Co., capital $1,000,000, has secured a seven-acre site formerly occupied by the Refined Iron & Steel Co., on the Pittsburgh & Lake Erie railroad, and will manufacture commercial potash by patented process; will use large quantities of blast furnace slag, mixed with Tennessee phosphate rock; M. R. Porter, president; J. H. Connor, vice president and general manager; B. M. Womsley, secretary and W. G. Hay, treasurer.

PULASKI, PA.—The Pulaski Novelty Co. is installing machinery for the manufacture of light wood work specialties, including patented clotheshorse.

SCRANTON, PA.—Scranton Iron & Steel Co., fire escapes, fences, etc., has been incorporated; $15,000 capital stock; by J. Harry Mears, Edgar L. Kuehling, Emma Krueger-man.

SHARON, PA.—Sims & Daly, Philadelphia, have been awarded a contract to build dam No. 1 at Coalburg, O., a few miles from Sharon; this will be one of three dams constituting a water conservation project for Sharon.

SOUTH BETHLEHEM, PA. — Bethlehem Steel Co. is expected to close for a large quantity of machine tool equipment without delay.

WASHINGTON, PA.—Relief Electric Light, Heat & Power Co. will build a $150 000 brick and steel power plant; Robert P. Reed, engineer, has plans.

WAYNESBORO, PA. — Waynesboro Iron Works has awarded a contract for a foundry building, to cost about $60,000.

YORK, PA.—Hench Drumgold Co., founder and machinist, has increased its debt limit to $30,000.

BRIDGETON, N. J.—E. Boone & Johnson Bros. plan an addition to their plant.

ELIZABETH, N. J.—Sentinel Safety Elevator Switch Co. has been incorporated to make safety appliances; $20,000 capital stock; by Eugene J. Kroft, Louisa Euler, Helena E. Kroft.

EAST ORANGE, N. J.—H. W. Paine & Co., mechanical engineers has been incorporated; $100 000 capital stock; Harold Paine, Francis F. Paine, Jesse E. Paine, East Orange.

IRVINGTON, N. J.—R. H. B. Mfg. Co., automobiles, motorcycles, has been incorporated; $20,000 capital stock; by William P. Reiboldt, Irvington; Gerald Hanney, Herbert L. Edinger, East Orange, N. J.

JERSEY CITY, N. J.—Ensor Mfg. Co., horse feeding devices has been incorporated; $200,000 capital stock; by Albert Ensor, George H. Robinson, Samuel Fairbanks, Jersey City.

NEWARK, N. J.—Morris Herrmann Co., 878 Mt. Prospect avenue, has let contracts for alterations to its factory building.

OCEAN CITY, N. J. — The Cape May county teachers' association has advocated the

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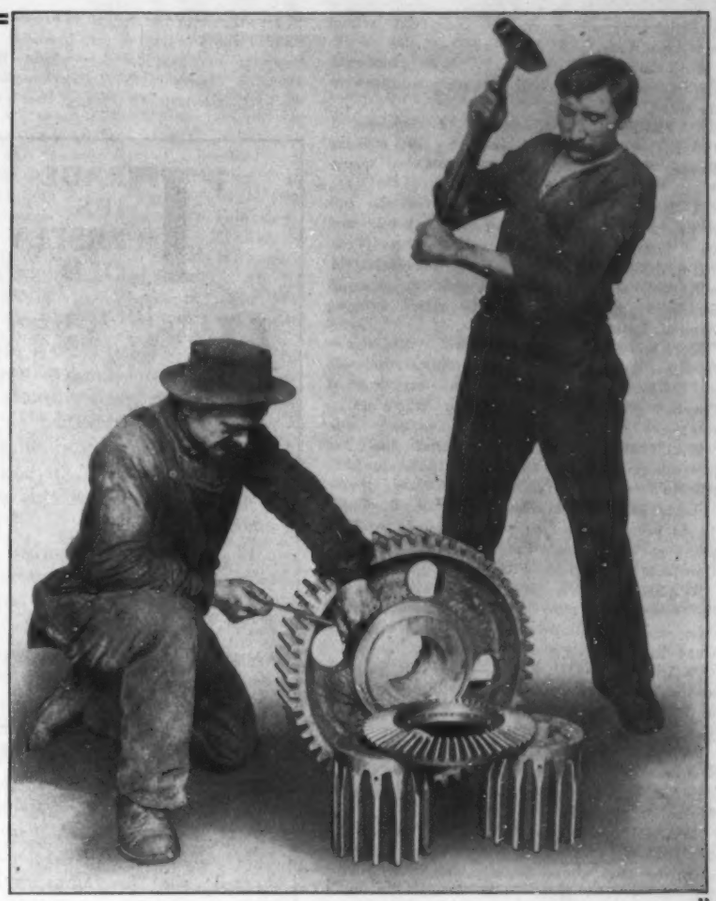

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establishment of a county industrial school in Ocean City.

PATERSON, N. J.—H. W. Mills Hardware Co. will erect a $6,000, two-story addition to its plant.

PATERSON. N. J.—Crew Silk Finishing & Piece Dye Works will erect a silk mill in Saddle River township; Alfred Crew, president.

TRENTON, N. J.—Globe Rubber Co. has plans prepared for a two-story, brick and steel factory on Prospect avenue.

TRENTON, N. J.—National Porcelain Co. will soon start work on its $30,000 plant at Southard street and Brunswick avenue; Samuel L. Dunkle is president.

WILMINGTON, DEL.—Leon Wilde Crawford has plans for a $25,000, three-story, 26 x 124-foot factory and store building at Seventh and Orange streets, for W. W. Bottomley.

BALTIMORE.—J. J. O'Conner has the general contract for the Dix Mfg. Co.'s $51,000 two-story, 120 x 120-foot factory.

BALTIMORE.—Architect George R. Callis Jr. is preparing plans for a two-story packing plant at Exeter and Lombard streets, for the Consolidated Beef & Provision Co.

WASHINGTON, D. C.—Commissioner of lighthouses will receive bids until Dec. 10 for cast iron and bronze metal work, etc., for Cape St. Elias light station, Alaska.

WASHINGTON, D. C.—Bureau of yards and docks, navy department, will receive bids until 11 a. m., Dec. 12 for nine 2,100,000-gallon, steel fuel-oil storage tanks.

WASHINGTON, D. C.—The supervising architect will receive bids until Dec. 2 for coal-handling apparatus for installation in the United States Mint at Philadelphia.

WASHINGTON. D. C.—Washington Asphalt Block & Tile Co. will erect three buildings, to cost about $8,000; machinery building, 50 x 150 feet; boiler house, 30 x 30 feet; office building, 16 x 24 feet.

WASHINGTON, D. C.—The bureau of supplies and accounts, navy department, is taking bids until Dec. 1 for lathes, grinders, buffing lathes, etc., for the Brooklyn, Philadelphia, Newport News and Annapolis navy yards.

## CENTRAL STATES

CANTON, O.—Canton Brass Foundry Co. has been incorporated; $20,000 capital stock; by Francis D. Held, F. W. Bond, C. B. McClintock, N. A. Sponseller, A. M. McCarty.

CINCINNATI.—Bids will be received until Dec. 1 for the proposed chemistry building of the University of Cincinnati; this includes all iron and steel work, electric work, heating and ventilating, and air washers.

CINCINNATI.—W. B. George, formerly of the I. & E. Greenwald Co., proposes to organize a company, capitalized at $150,000, for the establishment of a gray iron foundry; it is proposed to use the old Greenwald property, owned by Franklin Alter.

CINCINNATI.—Iron work for the rotunda and chapel of the Good Samaritan Hospital will be furnished by the Pothoff Construction Co.; the contract for this work was let through G. W. Drach, architect in charge of construction, and calls for about 400 tons.

CINCINNATI.—Ice making machinery will be required by the Loveland Ice Co. which has been incorporated at $25,000, and for which a plant, 30 x 45 feet, is being erected at Loveland, a suburb; plans are being prepared by the Reliance Engineering Co., of this city; estimates will be received in about five weeks.

CLEVELAND.—Engeln Electric Co. has increased its capital from $25,000 to $50 000.

CLEVELAND.—Commissioner of purchases and supplies will receive bids until noon Dec. 4 for general service pump and equipment for the municipal electric light plant.

CLEVELAND.—Bids will be received Dec. 1 for the erection of a factory building on East Twenty-fourth street, between Payne and Superior avenues, to cost about $25.000 for Hunt & Dorman Co., sheet metal specialty worker; Earnest McGeorge has plans which call for a two-story, brick, steel and concrete structure to have 22,000 square feet of floor space and to be completed by March 1.

CLEVELAND.—Euclid Avenue-Carnegie Co. has leased three acres between Euclid and Carnegie avenues opposite East Sixty-sixth street, and will erect a $100,000 apartment house.

CLEVELAND.—Parsons & Parsons will erect a $10,500, two-story, 38 x 80-foot, brick and concrete factory building at 2176 East Seventy-sixth street, to replace the building destroyed by fire last spring.

CLEVELAND.—Cleveland Builders' Supply Co. has purchased six acres on the Belt line railroad, adjoining the Chandler Motor Car Co. at East 131st street and St. Clair avenue, and will erect a large concrete warehouse; machinery will be electrically driven.

CUMMINSVILLE, O.—Haven Malleable Castings Co. was badly damaged by fire; loss about $10,000.

DAYTON, O.—S. Daneman & Sons Co., maker of buttons, has been incorporated; $15,000 capital stock; by Samuel Daneman, A. J. Daneman, Louis E. Daneman, Myra L. Daneman, Emma Daneman.

EAST PALESTINE, O.—Village expects to be called upon to spend $40,000 for the installation of a water system for the Hill district.

NILES, O.—Niles Forge & Mfg. Co. has increased its capital stock from $30,000 to $75,000 and has undertaken extensive improvements; contracts have been let for a 50 x 250 building, for structural steel shops; a 40 x 60 feet building for a forge shop, and an office building, Charles T. Swaney is president.

PORTSMOUTH, O.—Architect W. A. De Voss has plans for a $60,000 public school building.

TOLEDO, O.—City Foundry Co. will erect a $4,000, 62 x 92-foot addition to its plant.

TOLEDO, O.—Toledo Metal Mfg. Co. has been incorporated; $60 000 capital stock; by J. F. Crossmiller, Wilber Owen, C. W. Owen, F. H. Crampton, R. G. Allen.

WOOSTER, O.—Board of trade is negotiating with Bernard McCarron for the establishment of a pottery; Wooster will be expected to raise $60,000.

ZANESVILLE, O.—Clay City Bending Co. has been incorporated; $5,000 capital stock; by Andrew Kimble, F. A. Kimble, F. C. Kimble, J. E. Kimble, Rose H. Kimble

FAIRMONT, W. VA.—Normal Braddock, Frederickstown, O., M. C. Swetland and George McCulley, Mt. Vernon, O., John A. Ford and A. J. Solomon, of Columbus, O., are interested in a new industry here for the manufacture of window glass; the plant is practically completed.

GLENVILLE, W. VA.—Frick Coal & Coke Co. has been incorporated; $1,500,000 capital stock; by Chas. E. Hogg. Chas. J. Hogg, L. E. Given, W. B. Hogg, M. P. Hogg, all of Point Pleasant, W. Va.

PARKERSBURG, W. VA.—Masonic Association has started the erection of a $100,000 three-story temple; the Prescott Construction

PARKERSBURG, W. VA.—Mingo Block Coal Corporation, coal and coke. has received its charter; George S. Sarver, E. A. Ferrin, C. C. Brown and Edwin S. Nely, Greenburg, Pa.; C. J. Pitgen, Pittsburgh Pa.

PRAIRIE DU SAC, WIS.—General contract for the erection of the proposed one-story, 60.9 x 108.9-foot, factory of the Shaw Motor Co., Chicago, Ill., at Prairie du Sac, has been awarded to Dresen Bros., Sauk City, Wis.; proposed building will be a machine and assembling shop and office building.

PRAIRIE DU SAC, WIS.—Village has been ordered to pay the Prairie du Sac Mill & Light Co., $5,000 together with the cost of materials on hand. for its plant, which is to be made a municipal property. The transfer has already

## TRADE TIPS TERSELY TOLD

*HERE is the kernel of the week's live new business items. This column contains items you cannot afford to overlook, arranged in handy form for the convenience of busy executives. If your time is limited, look for this page in every issue.*

*W. B. Henderson, bureau of foreign and domestic commerce, 1207 Alaska building, Seattle, has information regarding foreign buyers desiring to be placed in touch with American manufacturers. A maker in the far east, specializing in steam and hot water heating plants, desires catalogs and full information with a view of purchasing from American houses. A Russian importer wishes to establish permanent relations with American exporters, for the following articles: Tubes and pipes, polished and unpolished iron with brass coverings from 3/8 to 1½ inches in diameter, about 100,000 pounds annually. A machine company in Canada wishes to negotiate with American makers of two and four-cylinder gasoline engines, both marine and stationary. A South American firm desires the names of American manufacturers of art metal work, metal corners, cornices and ceilings.*

*Oregon-Washington Railway & Navigation Co. has started laying track at Spokane, Wash., preparatory to building a machine shop, roundhouse, turntable, etc., at an estimated cost of $150,000. This company also plans the construction of a roundhouse and other improvements at The Dalles, Wash., to cost about $140,000.*

*Christie Engine Co. has contracted for a 12-acre factory site at Clinton, Ia., and contemplates spending $100,000 for the erection of a foundry and machine shop for the manufacture of the Christie engine.*

*H. H. Latham Machinery Co., Chicago, has arranged for the construction of a three-story 100 x 150-foot, mill building at Fulton and Ann streets.*

taken place. The plant is of the hydro-electric type on Wisconsin river and will be gradually enlarged.

RACINE, WIS.—C. H. Tharinger, architect, Milwaukee, is making plans for a $20,000, three-story, 34 x 60-foot warehouse.

RACINE, WIS.—Gold Medal Camp Furniture Co. is razing several frame factory buildings in preparation for the erection of a brick and steel fireproof building during the winter.

SHEBOYGAN, WIS.—Sheboygan Cigar Box Lumber & Mfg. Co. has purchased a building site, 670 x 135 feet, on the North-Western main line and will at once award contracts for the construction of its proposed factory, plans for which have been prepared by C. F. Ringer & Son, architects, Milwaukee, as noted. It will be two story, 60 x 140 feet, with power house 40 x 50 feet, dry kiln, 35 x 60 feet and a 2-story warehouse.

SUPERIOR, WIS.—Superior city commission is making an investigation of garbage incinerating plant installations in Minnesota and Wisconsin with a view to installing similar equipment for the city of Superior at a cost of $18,000 to $25,000; Joseph S. Konkel is mayor and C. M. Gould is health commissioner.

TURTLE LAKE, WIS.—Turtle Lake Electric Light & Power Co. has been incorporated; $10.000 capital stock; by P. L. Speed, C. Speed, Silas Speed, Perry Speed, Barron.

TWO HARBOR, WIS.—J. W. Heffner and John Borg have purchased several lots and will erect a garage and machine shop, 52 x 60 feet, brick construction; a small lathe, drill press and other light equipment will be installed.

WAUKESHA, WIS.—Genesee Mfg. Co., capital $6,000 has been incorporated at Waukesha, by Robert G. Morey, W. C. Stephen and G. C. Morey.

FOREST CITY, MO.—Forest City Milling & Elevator Co. has been incorporated; $25,000 capital stock; by A. H. Bailey, G. L. Penney, James P. Morris.

KANSAS CITY, MO.—Rotary Valve Mfg. Co. has been incorporated; $250,000 capital stock; by C. R. Jones, J. M. Burgner, A. L. Sherman.

SHELL CITY, MO.—Shell City Telephone Co. has been incorporated; $10,000 capital stock; by W. L. Young.

ST. JOSEPH, MO.—Berry Iron & Steel Co. has been incorporated; $2.000 capital stock; by G. D. Berry, O. Halstead and A. R. Berry.

ST. LOUIS.—Warren Steel Castings Co. Dorcas and Lyon streets, was damaged by fire.

ST. LOUIS.—Gillham Motor Co. has been incorporated; $10,000 capital stock; by Frank R. Tate, Fred C. Gillham, Henry W. Blodgett Jr

ST. LOUIS.—C. J. and F. E. Briner, dealers in electrical machinery, 204-6-8 Franklin avenue, are planning to erect a factory and salesroom building on Morgan street.

ST. LOUIS.—Mississippi Electric Navigation Co. has been incorporated; $2,000,000 capital stock; by J. B. Trescott, L. H. DuPaul, R. H. Tait.

ST. LOUIS.—Burnall Co. of Missouri manufacture fuel-saving devices, has been incorporated $125,000 capital stock; by Frank H. Colony, Albert F. H. Seelig, et al.

ST. LOUIS.—E. E. Ames, president of the Pioneer Box Co., Crawfordsville, Ind., has purchased property at Eleventh and Converse, East St. Louis, and will establish the company's main plant at once; plans include two brick buildings, one 100 x 150 feet, the other 90 x 120 feet; total cost about $75,000.

ATLANTIC, IA.—Atlantic Mfg. Co., maker of scythes and automatic transmission oilers for automobiles, was badly damaged by fire.

CEDAR FALLS, IA.—Lasure Mfg. Co., recently organized for the manufacture of a friction clutch, has arranged with the Cedar Falls Machinery Co. for its manufacture; company will erect a new building.

CLINTON, IA.—Christie Engine Co. has contracted for a 12-acre factory site, and contemplates spending $100,000 for the erection of a foundry and machine shop for the manufacture of the Christie air-steam engine.

DAVENPORT, IA.—Ideal Cyaniding Process Co. has been incorporated to extract metals and minerals from ores, erect mills, etc.; $100,000 capital stock; by A. F. Tanner, West Allis, Wis.; H. L. Stiles, Milwaukee, Wis.; Otto Hill, Davenport, et al.

MUSCATINE, IA.—Plans are being prepared for the second addition to the Ziedler Concrete factory in South Muscatine.

PERRY, IA.—Osmundson Spade Mfg. Co. is erecting a temporary building to replace the plant recently destroyed by fire; permanent building will be erected next spring.

BRECKENRIDGE, MINN.—P. E. Truax, county auditor, will receive bids until Dec. 5 for ten bridges; one 20 x 26 feet, one 20 x 24 feet, two 16 x 24 feet, two 20 x 20 feet, four 16 x 20 feet.

NEW ULM, MINN.—Novelty Electric Co. has started work on its proposed factory building for manufacturing electric batteries.

ST. PAUL, MINN.—A. H. Stem, Endicott building, St. Paul, has made plans for Manheimer Brothers for a department store building at Sixth street and St. Peter, to cost $1,000,000. Bids on the general contract will close Nov. 27; 10 stories, 150 x 204, brick and reinforced concrete.

## SOUTHERN STATES

PETERSBURG, VA.—Fire badly damaged the molding shed of the Appomattox Iron Works.

RALEIGH, N. C.—Raleigh Iron Works is expected to close without delay on a quantity of machinery to be used in making shrapnel.

ATLANTA, GA.—Niel-Young Co., furniture manufacturer, will erect a $9,000 factory building on Lakewood avenue.

MOBILE, ALA.—Hallet Mfg. Co., recently badly damaged by fire, will re-establish plant and install complete sawmill and handle factory equipment.

VICKSBURG, MISS.—J. P. Laughlin, chancery clerk, will receive bids until noon, Dec. 9 for a steel and concrete bridge over Big Black river at Holts Ferry.

NEW ORLEANS.—An ordinance has been introduced providing for the purchase of property with a view of doubling the capacity of the municipal repair plant.

NEW ORLEANS.—Board of commissioners of the Port of New Orleans will receive bids until 8 p. m., Dec. 14 for power house, terminal buildings and warehouses to have a combined floor space of about 727,000 square feet and, excepting the office building and garage, to be one story; deposit required with proposal $25,000, and bond with contract one-quarter of the contract price, but not less than $200,000.

SAN ANTONIO, TEX.—Star Clay Products Co. has increased its capital from $50,000 to $100,000.

LOCUST GROVE, OKLA.—Locust Grove Light & Power Co. has been incorporated; $10,000 capital stock; by H. O. Long, O. W. Killum, Locust Grove; Thomas McCrowshy, Webb City, Mo.

MUSKOGEE, OKLA. — Midland Machine Works have been incorporated; $5,000 capital stock; by H. A. von Unweth, H. L. von Unweth. Charles Nelson Jr.

OKLAHOMA CITY, OKLA.—County commissioners will receive bids until Dec. 9 for 20 bridges to cost about $30,000.

SCHULTER, OKLA.—Fursman Coal Co., capitalized at $5,000, will require mining machinery and screens for the development of 500 acres.

TULSA, OKLA.—R. E. Curran, county clerk, will receive bids until 6 p. m., Dec. 7 for four bridges.

## WESTERN STATES

ABERDEEN, S. D.—Plans have been approved and work will start soon on the proposed interlocking plant east of Aberdeen.

CHANUTE, KAN.—Chanute Window Glass Co., $80,000 plant was badly damaged by fire.

GREAT FALLS, MONT.—United States reclamation service will receive bids until Dec. 8 for the construction of a portion of the Pishkun reservoir supply canal; contract will involve about 245,000 pounds of reinforcing steel.

ODGEN CITY, UTAH.—Grand Canyon Canal & Power Co. has been formed, and the power sites held by Alexander Toponce on John Day's river have been taken over by the company; S. W. Badcon, president.

LEWISTOWN, IDA.—State highway board has approved a franchise to A. G. Nortz for a street car line across the interstate Lewistown-Clarkstown bridge, to be in operation Sept. 1, 1915.

RIDGEFIELD, WASH.—Battle-McClelland Shingle Mill Co. has applied to the council for an electric light franchise.

SEATTLE.—Contract for the construction of the lighthouse tender Rose has been awarded to the Anderson Steamboat Co. at $87,500.

SEATTLE.—It it reported the Puget Sound Navigation Co. is negotiating with shipbuilding plants for construction of geared turbine, 24-knot, passenger boat in the spring.

SEATTLE.—Plans for a two-story slow burning dock house with timber frame and sheathed in sheet iron have been approved for the erection here by the Grand Trunk Pacific Railway Co. at Montreal; bids probably will be asked shortly.

SEATTLE.—A firm in South America advises an American consul it desires to receive the names of American manufacturers of art metal work, metal corners, cornices and ceilings. Refer to No. 14353. An American consular officer in the far east reports name and address of a firm making specialty in steam and hot water heating plants and desiring to receive catalogues and full information with a view to purchasing from American houses. Refer to No. 14346. An American consular officer in Russia forwards the name and address of an importer desiring to establish permanent relations with American Exporters for the following articles: Tubes and pipes, polished and unpolished iron with brass coverings from ⅜ to 1½ inches in diameter, about 100,000 annually. Refer to No. 14326. A machine company in Canada has reported to an American consul that it wishes to be put in touch with makers of 2 and 4 cylinder gasoline engines, both marine and stationary. Further details on all the above to be had of W. B. Henderson, bureau of foreign and domestic commerce, 1207 Alaska building, Seattle.

SPOKANE.—Oregon-Washington Railway & Navigation Co. has started laying track here preparatory to building a machine shop, roundhouse, turntable, powerhouse, etc.; estimated cost $150,000.

WALLA WALLA, WASH.—Walla Walla Hot House Vegetable Co. will erect a range of greenhouses; among other things the buildings will require 35,000 feet of 1¼-inch mild steel pipe and a gravity steam heating system.

THE DALLES, ORE.—Oregon-Washington Railway & Navigation Co. plans the construction of a round house and other improvements here to cost about $140,000.

SAN FRANCISCO.—Noble Electric Steel Co. will increase its capital stock from $1 000,000 to $1,500,000 for increasing the company's facilities for the manufacture of ferro-manganese and allied products.

# IRON AND STEEL PRICES

**Corrected up to Tuesday noon**

## PIG IRON

(Delivery to April 1.)

| | |
|---|---|
| Bessemer, valley | $13.75 to 14.00 |
| Bessemer, Pittsburgh | 14.70 to 14.95 |
| Basic, Pittsburgh | 13.45 to 13.60 |
| Basic, eastern Pa. | 13.50 |
| Malleable, Pittsburgh | 13.70 to 13.95 |
| Malleable, Chicago | 13.00 to 13.50 |
| Malleable, Philadelphia | 14.50 to 15.00 |
| Malleable, Buffalo | 12.00 to 13.00 |
| No. 1X Philadelphia | 14.75 to 15.00 |
| No. 2 foundry, Pittsburgh | 13.70 to 13.95 |
| No. 2 foundry, Cleveland | 13.25 to 13.50 |
| No. 2 foundry, Ironton | 13.00 |
| No. 2 foundry, Chicago | 13.00 to 13.50 |
| No. 2X foundry, Philadelphia | 14.25 to 14.50 |
| No. 2X fdy., (N. J. tidewater) | 13.75 to 14.25 |
| No. 2X foundry, Buffalo | 12.75 to 13.00 |
| No. 2 plain, Philadelphia | 14.00 to 14.25 |
| No. 2 plain, (N. J. tidewater) | 13.75 to 14.00 |
| No. 2 plain, Buffalo | 12.75 to 13.00 |
| No. 2 southern, Birmingham | 10.00 |
| No. 2 southern, Cincinnati | 12.90 |
| No. 2 southern, Chicago | 14.00 to 14.25 |
| No. 2 southern, Phila. delivery | 14.50 |
| No. 2 southern, Cleveland | 14.00 |
| No. 2 south'n, New York, docks | 14.25 to 14.50 |
| No. 2 southern Boston, docks | 14.25 to 14.50 |
| No. 2 south'n interior New Eng. | 15.00 to 16.00 |
| No. 2 southern, St. Louis | 14.00 to 14.25 |
| Virginia No. 2X furnace | 12.25 to 12.75 |
| Virginia 2X, Philadelphia | 15.00 to 15.25 |
| Virginia, 2X, Jersey City | 15.25 to 15.50 |
| Virginia, 2X, Boston points | 15.50 to 15.75 |
| Gray forge, (eastern Pa.) | 13.50 to 13.75 |
| Gray forge, Pittsburgh | 13.45 to 13.70 |
| Gray forge, Birmingham | 9.00 to 9.50 |
| Silveries, 8 per cent, Cleveland | 17.63 |
| Silveries, 5 per cent Birmingh'm | 12.50 |
| Silveries, 5 per cent, Chicago | 16.35 |
| Standard low phos., Phil. | 19.00 to 20.00 |
| Lebanon low phos., furnace | 16.00 to 16.50 |
| Low phos., Pittsburgh | 20.95 to 21.20 |
| Charcoal, Lake Superior, Chgo., Nos. 1 to 4 | 15.75 to 16.50 |
| Charcoal, Buffalo | 15.75 to 16.75 |
| Charcoal, Birmingham | 25.00 |

## IRON ORE

(Lower lake ports.)

| | |
|---|---|
| Old range Bessemer, 55 per cent | $3.75 |
| Mesabi Bessemer, 55 per cent | 3.50 |
| Old range, non-Bess., 51½ per cent | 3.00 |
| Mesabi non-Bessemer, 51½ per cent | 2.85 |

(Per unit Philadelphia.)

| | |
|---|---|
| Foreign Bess., 50 to 65 per cent | 7c |
| Foreign non-Bess., 50 to 65 per cent | 7c |

## COKE

(At the ovens.)

| | |
|---|---|
| Connellsville furnace | $1.60 to 1.75 |
| Connellsville fur. contr. | 1.65 to 1.75 |
| Connellsville foundry | 2.00 to 2.40 |
| Connellsville fdy., contr. | 2.25 to 2.50 |
| Wise county furnace | 1.75 to 2.00 |
| Wise county foundry | 2.10 to 2.40 |
| Pocahontas furnace | 1.75 to 2.00 |
| Pocahontas foundry | 2.00 to 2.25 |
| New River, foundry | 2.50 to 3.00 |
| New River, furnace | 2.00 to 2.25 |

## FERRO-ALLOYS

| | |
|---|---|
| Ferro-manganese, Baltimore | $68.00 |
| Ferro-silicon, 50 per cent, Pbgh. | 71.00 to 73.00 |
| Ferro-silicon, 50 per cent, Phila. | 71.00 to 73.00 |
| Ferro-sil., 12 to 13 per cent, Pgh. | 22.90 |
| Ferro-sil., 11 to 12 per cent, Pgh. | 21.90 |
| Ferro-sil., 10 to 11 per cent, Pgh. | 20.90 |
| Ferro-sil., 9 to 10 per cent, Pgh. | 19.90 |
| Ferro-carbon titanium, carloads, per lb. | 8c to 12½c |

## SEMI-FINISHED STEEL

| | |
|---|---|
| Open-hearth billets, Phila. | $21.40 to 21.90 |
| Forging billets, Phila. | 24.40 to 25.40 |
| Forging billets, Pbgh. (nom.) | 24.00 to 24.50 |
| Wire rods, Pittsburgh | $25.00 to 26.00 |
| Billets, Pbgh. and Ygnst. | $19.00 to 19.50 |
| Sheet bars, Pbgh. and Ygnst. | 19.50 to 20.00 |

## RAILS AND TRACK MATERIAL

| | |
|---|---|
| Stand. Bess., rails, Pbgh. | 1.25c |
| Stand. open-hearth rails, Pbgh. | 1.34c |
| Lgt. rails, 8 lbs., Pbgh. & Chgo. | 1.22c |
| Lgt. rails, 12 lbs., Pbgh. & Chgo. | 1.17c |
| Lgt. rails, 16 to 20 lbs., Pbgh. & Chgo. | 1.12c |
| Lgt. rails, 25 to 45 lbs., Pbgh. and Chgo. | 1.07c |
| Relaying rails, standard, Pbgh. & Chgo. | $23.00 to 24.00 |
| Relaying rails, light, Chicago | 21.50 to 22.50 |
| Angle bars, st. sect. Pbgh. base | 1.50c |
| Angle bars, st. sections, Chgo. | 1.50c |
| Spikes, railroad, Pbgh. | 1.40c to 1.45c |
| Spikes, railroad, Chgo. | 1.50c |
| Track bolts, Pbgh. | 2.00c |
| Track bolts, Chgo. | 2.00c |

## SHAPES, PLATES AND BARS

| | |
|---|---|
| Structural shapes, Pittsburgh | 1.10c |
| Structural shapes, Chicago | 1.25c to 1.34c |

### Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama Canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

| | |
|---|---|
| From New York | $0.25 |
| From Pittsburgh | .41 |
| From Youngstown | .43 |
| From Niles | .43 |
| From Wheeling | .41 |
| From Steubenville | .41 |
| From Johnstown | .395 |
| From Coatesville | .34 |
| From Steelton | .35 |
| From Bethlehem | .325 |
| From Cleveland | .44 |
| From Chicago | .55 |

| | |
|---|---|
| Structural shapes, Philadelphia | 1.25c to 1.30c |
| Structural shapes, New York | 1.26c to 1.31c |
| Structural shapes, San Francisco | 2.00c to 2.05c |
| Tank plates, Chicago | 1.25c to 1.34c |
| Tank plates, Pittsburgh | 1.05c to 1.10c |
| Tank plates, Philadelphia | 1.25c to 1.30c |
| Tank plates, New York | 1.25c to 1.30c |
| Bars, soft steel, Pittsburgh | 1.10c |
| Bars, soft steel, Chicago | 1.25c to 1.34c |
| Bars, soft steel, Philadelphia | 1.25c to 1.30c |
| Bars, soft steel, New York | 1.26c to 1.31c |
| Hoops, carloads, Pittsburgh | 1.25c |
| Hoops, less carloads, Pittsburgh | 1.30c |
| Bands, Pittsburgh | 1.10c |
| Shafting, carloads, Pbgh., disc. contract | 66 to 67 |
| Shaft'g less carl'ds, Pbgh., disc. | 63 |
| Bar iron, Chicago | 0.95c to 1.05c |
| Bar iron, Philadelphia | 1.12c to 1.19c |
| Bar iron, New York | 1.10c to 1.20c |
| Bar iron, Cleveland | 1.15c to 1.20c |
| Bar iron, Pittsburgh | 1.20c |
| Hard steel bars, Chicago | 1.25c to 1.30c |
| Smooth finish. mchy. steel, Chi. | 1.68c |

## SHEETS AND TIN PLATE

| | |
|---|---|
| No. 28, black, Pittsburgh | 1.85c to 1.90c |
| No. 28, black, Chicago | 1.99c to 2.09c |
| No. 28, tin mill, black, Pbgh. | 1.90c |
| No. 28, galvanized, Pbgh. | 2.85c to 2.90c |
| No. 28, galvanized, Chgo. | 2.99c to 3.09c |
| No. 10, blue, annealed, Pbgh. | 1.35c to 1.40c |
| No. 10, blue, annealed, Phila. | 1.55c to 1.60c |
| Tin plate, 100 lb., coke, base | $3.15 to 3.25 |

## EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

| | |
|---|---|
| Single pickled, cold roll., and re-an. | 30 cents |
| Hot roll'd, pickl'd and ann., tin mill | 25 cents |
| Full pickled, cold rolled and re-ann. | 50 cents |
| Auto sheets | 75 cents |
| Blued stove pipe stock | 10 cents |
| Range steel | 30 cents |
| Re-squaring | 10 cents |
| Roller levelling | 10 cents |
| Patent levelling and re-squaring | 35 cents |
| Oiling sheets | 10 cents |
| Deoxidizing | 10 cents |
| Lime finish | 10 cents |
| Open hearth steamping steel, free from mill scale | 55 cents |
| Special open hearth deep stpg. steel free from mill scale | 80 cents |

Extra deep special auto body stock $1.25

Ext. for 28 gage ov. 32 to 36-in. wide 10 cents
No reduction for sheets not annealed

The above extras apply on both sheet and tin mill specifications, at the same rate.

## IRON AND STEEL PIPE

(Pittsburgh.)

| | Black Butt-weld. | Galv. Butt-weld. |
|---|---|---|
| Steel, ¾ to 3 inches | 81 | 72½ |
| Iron, ¾ to 2½ inches | 70 | 61 |
| | Lap-weld. | |
| Stele, 2½ to 6 inches | 80 | 71½ |

## BOILER TUBES

| | |
|---|---|
| Steel, 3½ to 4½ inches | 73 |
| Iron, 3½ to 4½ inches | 60 |

## WIRE PRODUCTS

| | |
|---|---|
| Wire nails, jobbers, Pittsburgh | $1.60 |
| Wire nails, retailers, Pittsburgh | 1.65 |
| Plain wire, jobbers, Pittsburgh | 1.40 |
| Plain wire, retailers, Pittsburgh | 1.45 |
| Galvanized wire, jobbers, Pbgh. | 1.80 |
| Galvanized wire, retailers, Pbgh. | 1.85 |
| Polished staples, Pbgh. | 1.60 |
| Galvanized staples, Pbgh. | 2.00 |
| Barb wire, painted, jobbers, Pbgh. | 1.60 |
| Barb wire, painted, retail'rs, Pbgh. | 1.65 |
| Barb wire, galv., retail's, Pbgh. | 2.05 |
| Barb wire, galv., jobbers, Pbgh. | 2.00 |

## BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 80 and 20; cut threads 80 and 15; larger or longer, 75 and 15.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter, rolled, 80 and 25; cut, 80 and 20; larger or longer, 80.

Gimlet and cone point lag or coach screws, 80 and 25.

Hot pressed square, blank or tapped nuts, $6.30 off list; hot pressed hexagon blank or tapped, $7.20 off.

Cold pressed, c. and t. square, blank or tapped, $6 off; hexagon, blank or tapped, ⅝ inch and larger, $7.20; ⅛-inch and smaller, $7.80.

## RIVETS

| | |
|---|---|
| Structural rivets, Pbgh. | 1.45c to 1.50c |
| Structural rivets, Chgo. | 1.68c |
| Boiler rivets, Pbgh. | 1.55c to 1.60c |
| Boiler rivets, Chgo. | 1.78c |

## SCREWS

(New York.)

| | |
|---|---|
| Lag, gimlet and cone point | 80 and 20 |
| Coach, gimlet point | 80 |
| Standard Jack | 70 and 10 |
| Mch., cut thread, flat head | 50 and 10 |
| Mach., cut thread, round head | 50 and 10 and 10 |
| Mch., cut thread, fillister hd. | 40 and 40 and 10 |
| Mch. rolled thread, flat head or round head | 80 and 10 |
| Set screws, iron | 75 and 10 and 10 |
| Set screws, steel, per cent advance over iron | 25 |
| Square head cap screws | 70 and 10 and 10 |
| Hexagon head cap screws | 70 and 10 and 10 |
| Fillister head cap screws | 60 and 10 and 10 |
| Flat head wood screws | 10 and 10 and 5 |
| Round head wood screws | 10 and 10 and 5 |

# IRON AND STEEL PRICES

**Corrected up to Tuesday noon**

## WROUGHT STEEL CAR WHEELS

| | |
|---|---|
| 33-inch engine truck wheels | $22.50 |
| 36-inch engine truck wheels | 23.50 |
| 33-inch tender wheels | 18.50 |
| 36-inch passenger train car and tender wheels | 21.50 |
| 33-inch freight car wheels | 15.50 |

All with standard 2½ inch rims and minimum standard hubs, usual extras applying for thicker rims and larger hubs; all f. o. b. cars, Pittsburgh.

## STEEL SHEET PILING

(Pittsburgh.)

| | |
|---|---|
| Base sizes | 1.55c to 1.60c |

## TWISTED REINFORCING BARS

(Soft steel, Pittsburgh mill.)

| | |
|---|---|
| ¼-inch and larger | 1.15c to 1.20c |
| 5/16-inch | 1.20c to 1.25c |
| ½-inch | 1.55c to 1.60c |
| 9/16-inch | 1.40c to 1.45c |
| ¼-inch | 1.65c to 1.75c |

## WIRE ROPE

| | |
|---|---|
| Galvanized, iron and steel | 47½ and 2½ |
| Bright, iron and steel | 55 and 2½ |

## COLD ROLLED STRIP STEEL

(Subject to regular extras.)

| Base price Cut to length | | 0.10 to 0.19 Carbon |
|---|---|---|
| Hard. | Soft. | 1½ in. and wider. |
| 2.85 | 3.10 | 0.100 and thicker. |
| 2.95 | 3.20 | 0.050 to 0.099 inc. |
| 3.10 | 3.35 | 0.035 to 0.049 inc. |
| 3.35 | 3.75 | 0.031 to 0.034 inc. |
| 3.60 | 4.00 | 0.025 to 0.030 inc. |
| 3.80 | 4.20 | 0.020 to 0.024 inc. |
| 4.70 | 5.20 | 0.017 to 0.019 inc. |
| 5.10 | 5.60 | 0.015 and 0.016 |
| 5.95 | 6.45 | 0.013 and 0.014 |
| 6.55 | 7.05 | 0.012 |
| 6.90 | 7.40 | 0.011 |
| 7.25 | 7.75 | 0.010 |
| Coils | | |
| 2.75 | 3.00 | 0.100 and thicker |
| 2.80 | 3.05 | 0.050 to 0.099 inc. |
| 2.95 | 3.20 | 0.035 to 0.049 inc. |
| 3.10 | 3.50 | 0.031 to 0.034 inc. |
| 3.20 | 3.60 | 0.025 to 0.030 inc. |
| 3.30 | 3.70 | 0.020 to 0.024 inc. |
| 3.60 | 4.10 | 0.017 to 0.019 inc. |
| 4.00 | 4.50 | 0.015 and 0.016 |
| 4.70 | 5.20 | 0.013 and 0.014 |
| 5.05 | 5.55 | 0.012 |
| 5.40 | 5.90 | 0.011 |
| 5.75 | 6.25 | 0.010 |

## CAST IRON PIPE

| | |
|---|---|
| Three to 20 in., Cleveland | $21.50 |
| Twenty-four to 48-inch, Cleveland | 21.00 |
| Four-inch, water, Chicago | 26.00 |
| Six to 12 inches, Chicago | 24.00 |
| Larger sizes, Chicago | 23.50 |
| Six-inch, water, New York | 20.00 to 20.50 |
| Four-inch, water, Birmingham | 19.50 |
| Six-inch and larger, Birmingham | 19.50 |

Gas pipe, $1 per ton higher than water.

## WAREHOUSE PRICES

| | |
|---|---|
| Steel bars, Chicago | 1.65c |
| Steel bars, Cleveland | 1.80c |
| Steel bars, Cincinnati | 1.70c to 1.85c |
| Steel bars, Philadelphia | 1.70c to 1.75c |
| Steel bars, New York | 1.80c |
| Steel bars, St. Louis | 1.70c |
| Iron bars, Chicago | 1.65c |
| Iron bars, Cleveland | 1.75c |
| Iron bars, St. Louis | 1.65c |
| Iron bars, Cincinnati | 1.65c to 1.75c |
| Iron bars, Philadelphia | 1.70c |
| Iron bars, New York | 1.65c to 1.70c |
| Hoops, Chicago | 2.15c |
| Shapes and plates, Chicago | 1.75c |
| Shapes and plates, Cleveland | 1.90c |
| Shapes and plates, Cincinnati | 1.80c to 1.90c |
| Shapes and plates, St. Louis | 1.80c |
| Shapes and plates, Philadelphia | 1.70c to 1.75c |
| Shapes and plates, New York | 1.85c |
| No. 10 blue ann. sheets, Chgo | 1.95c |
| No. 10 blue ann. sheets, Cleve | 2.05c |
| No. 10 blue ann. sh., St. Louis | 2.00c |
| No. 10 blue ann. sheets, Cinci | 1.95c |
| No. 28 black sheets, Chgo | 2.55c |
| No. 28, black sheets, Cleveland | 2.45c |
| No. 28 black sheets, Cincinnati | 2.45c to 2.55c |
| No. 28 black sh., St. Louis | 2.55c |
| No. 28 galv. sheets, Chgo | 3.55c |
| No. 28 galv. sheets, Cleveland | 3.35c |
| No. 28 galv. sheets, Cincinnati | 3.40c to 3.55c |
| No. 28 galv. sheets, St. Louis | 3.55c |

## Freight Rates, Coke

Connellsville regions, per 2,000 lbs., to:—

| | |
|---|---|
| Baltimore | $1.80 |
| Buffalo | 1.85 |
| Chicago | 2.50 |
| Cleveland | 1.60 |
| Detroit | 2.10 |
| East St. Louis | 2.80 |
| Joliet | 2.50 |
| Louisville | 2.50 |
| Milwaukee | 2.70 |
| New York | 2.85 |
| Philadelphia | 2.05 |
| Pittsburgh | .75 |
| Richmond, Va. | 2.94 |
| Toledo | 1.85 |
| Valley Furnaces | 1.20 |
| Cincinnati | 2.00 |

## IRON AND STEEL SCRAP

(Net Tons.)

| | |
|---|---|
| No. 1 railroad wrought, Chgo. | $ 7.50 to 7.75 |
| No. 1 railroad wrought, Cleve. | 9.00 to 9.50 |
| No. 1 railroad wrought, St. L. | 7.00 to 7.25 |
| No. 1 railroad wrought, Cinci. | 8.00 to 8.50 |
| No. 2 railroad wrought, Chgo. | 7.00 to 7.25 |
| No. 2 railroad wrought, St. L. | 7.00 to 7.25 |
| Arch bars and transoms, Chgo. | 10.50 to 11.00 |
| Arch bars and transoms, St. L. | 10.25 to 10.50 |
| Knuckles, coup. & spr'gs, Chgo. | 8.75 to 9.00 |
| Knuckles, coup. & spr'gs, St. L. | 8.00 to 8.25 |
| Shafting, Chicago | 11.50 to 12.00 |
| Shafting, St. Louis | 10.00 to 10.25 |
| Steel car axles, Chgo. | 10.50 to 11.00 |
| Steel car axles, St. Louis | 10.00 to 10.25 |
| Locomotive tires, Chicago | 9.00 to 9.50 |
| Locomotive tires, St. Louis | 8.00 to 8.25 |
| Cut forge, Chicago | 7.00 to 7.25 |

## Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 pounds to:—

| | |
|---|---|
| New York | 16 cents |
| Philadelphia | 15 cents |
| Boston | 18 cents |
| Buffalo | 11.6 cents |
| Baltimore | 14½ cents |
| Cleveland | 10.5 cents |
| Cincinnati | 15.8 cents |
| Chicago | 18.9 cents |
| Minneapolis and St. Paul | 32.9 cents |
| Denver | 68.6 cents |
| St. Louis | 23.6 cents |
| New Orleans | 30 cents |
| Birmingham | 45 cents |
| Pacific coast, (all rail) | 80 cents |
| Pacific coast, via Panama can'l | 41 cents |

| | |
|---|---|
| Pipes and flues, Chicago | $ 5.75 to 6.00 |
| Pipes and flues, Cleveland | 6.75 to 7.00 |
| Pipes and flues, St. Louis | 5.00 to 5.25 |
| No. 1 cast, Chicago | 9.00 to 9.25 |
| No. 1 cast, Cleveland | 9.50 to 10.00 |
| No. 1 cast, Cincinnati | 8.50 to 9.00 |
| No. 1 cast, St. Louis | 9.00 to 9.25 |
| No. 1 busheling, Chicago | 6.50 to 6.75 |
| No. 1 busheling, Cleveland | 8.00 to 8.25 |
| No. 1 busheling, Cincinnati | 5.75 to 6.25 |
| No. 1 busheling, St. Louis | 6.50 to 6.75 |
| No. 2 busheling, Chicago | 5.25 to 5.75 |
| No. 1 boiler plate, cut Chgo. | 5.50 to 5.75 |
| No. 1 boiler plate, cut, Buffalo | 9.00 to 9.50 |
| No. 1 boiler plate, cut, St. L. | 5.50 to 6.00 |
| Boiler punchings, Chicago | 8.25 to 8.75 |
| Cast borings, Chicago | 4.50 to 5.00 |
| Cast borings, Cleveland | 5.50 to 5.75 |
| Cast borings, Cincinnati | 4.25 to 4.75 |
| Cast borings, St. Louis | 3.50 to 4.00 |
| Machine shop turnings, Chgo. | 4.50 to 4.75 |
| Machine shop turnings, Cleve. | 5.00 to 5.25 |
| Machine shop turnings, Cinci. | 4.25 to 4.75 |
| Machine shop turnings, St. L. | 4.00 to 4.50 |
| Malleable agl., Chicago | 7.50 to 7.75 |
| Malleable agricultural, St. Louis | 5.75 to 6.00 |
| Malleable, railroad, Chicago | 7.75 to 8.25 |
| Malleable, railroad, Cincinnati | 6.50 to 7.00 |
| Malleable, railroad, St. Louis | 6.00 to 6.75 |
| Angle bars, iron, Chicago | 10.50 to 11.00 |
| Angle bars, iron, St. Louis | 9.25 to 9.50 |
| Angle bars, steel, Chgo. | 7.75 to 8.00 |
| Angle bars, steel, St. Louis | 8.00 to 8.25 |
| Stove plate, Chicago | 8.25 to 8.50 |
| Stove plate, Cleveland | 7.50 |
| Stove plate, Buffalo | 9.00 to 9.75 |
| Stove plate, Cincinnati | 6.50 to 7.00 |
| Stove plate, St. Louis | 7.00 to 7.25 |
| Bundled sheet, Cincinnati | 4.00 to 4.50 |

(Gross Tons.)

| | |
|---|---|
| Heavy melting steel, Pbgh. | $10.00 to 10.25 |
| Heavy melting steel, Buffalo | 10.00 to 10.50 |
| Heavy melting steel, Chicago | 8.00 to 8.50 |
| Heavy melting steel, Cleveland | 9.00 to 9.50 |
| Heavy melting steel, Cincinnati | 9.00 to 9.50 |
| H'vy melting steel, eastern Pa. | 9.00 to 9.50 |
| Heavy melting steel, New York | 7.50 to 7.75 |
| Heavy melting steel, St. Louis | 10.50 to 11.00 |
| Bundled sheet, Buffalo | 6.25 to 6.50 |
| Grate bars, Buffalo | 9.00 to 9.25 |
| Grate bars, New York | 6.50 to 7.00 |
| No. 1 railroad wr'ght, east. Pa. | 11.00 to 11.50 |
| No. 1 railroad wrought, Pbgh. | 10.00 to 10.50 |
| No. 1 R. R. wght., New York | 8.50 to 9.00 |
| No. 1 R. R. wrought, Buffalo | 10.00 to 10.50 |
| Shafting, New York | 11.00 to 11.50 |
| Shafting, St. Louis | 12.50 to 13.00 |
| Wrought pipe, New York | 7.25 to 7.50 |
| Wrought pipe, eastern Pa. | 9.25 to 9.75 |
| Mch. shop turnings, New York | 5.00 to 5.25 |
| Machine shop turnings, Buffalo | 5.50 to 6.00 |
| Mch. shop turnings, Pbgh. | 7.50 to 8.00 |
| Mch. shop turnings, eastern Pa. | 7.75 to 8.00 |
| Cast borings, New York | 5.00 to 5.25 |
| Cast borings, eastern Pa. | 7.75 to 8.00 |
| Cast borings, Buffalo | 6.00 to 6.50 |
| Cast borings, Pittsburgh | 8.00 to 8.50 |
| Stove plate, (Jersey points) | 8.00 to 8.50 |
| Stove plate, Pittsburgh | 9.00 |
| Stove plate, eastern Pa. | 8.00 to 8.50 |
| Shoveling steel, Chicago | 7.25 to 8.00 |
| Shoveling steel, St. Louis | 7.00 to 7.25 |
| Reroll'g rails, 5 ft. & ov., Pbgh. | 11.50 |
| Reroll. rails, 5 ft. & ov., Chgo. | 9.50 to 9.75 |
| Reroll. rails, 5 ft. & ov., Cleve. | 11.00 to 11.50 |
| Reroll. rails, 5 ft. & ov., E. Pa. | 10.50 to 11.00 |
| Reroll. rails, 5 ft. & ov., St. L. | 9.50 to 9.75 |
| Steel rails, short, Chicago | 9.00 to 9.50 |
| Steel rails, short, Cleveland | 11.00 to 11.50 |
| Steel rails, short, St. Louis | 8.75 to 9.00 |
| Iron rails, Cleveland nom. | 11.75 to 12.00 |
| Iron rails, Cincinnati | 10.25 to 10.75 |
| Iron rails, eastern Pa. | 13.50 to 14.00 |
| Iron rails, St. Louis | 9.75 to 10.00 |
| Iron rails, Pittsburgh | 13.00 to 13.50 |
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| Frogs, switches & g'rds, St. L. | 9.00 to 9.25 |
| Car wheels, (iron), Pittsburgh | 10.50 to 11.00 |
| Car wheels, (steel), Pittsburgh | 11.50 to 12.50 |
| Car wheels, Chicago | 10.00 to 10.25 |
| Car wheels, eastern Pa. | 9.50 to 10.00 |
| Car wheels, Buffalo | 10.50 to 11.00 |
| Car wheels, (N. J. points) | 9.25 to 9.50 |
| Car wheels, St. Louis | 9.50 to 10.00 |
| Iron axles, Pittsburgh | 18.00 to 19.00 |
| Iron axles, Cincinnati | 19.00 to 20.00 |
| Iron axles, eastern Pa. | 18.50 to 19.00 |
| Iron axles, Buffalo | 19.00 to 19.50 |
| Iron axles, Chicago | 15.00 to 15.50 |
| Steel car axles, New York | 11.00 to 11.50 |
| Steel car axles, Buffalo | 12.00 to 12.50 |
| Steel car axles, Cleveland | 12.00 to 12.50 |
| Steel car axles, eastern Pa. | 12.50 to 13.00 |
| No. 1 busheling, Buffalo | 8.25 to 8.75 |
| No. 1 busheling, Pittsburgh | 9.00 |
| No. 2 busheling, Buffalo | 5.75 to 6.25 |
| Low phosphorus steel, Buffalo | 14.00 to 14.50 |
| Low phosphorus steel, Pbgh. | 13.00 to 13.50 |
| Low phos. steel, eastern Pa. | 13.50 to 14.00 |
| No. 1 forge, eastern Pa. | 8.00 to 8.25 |
| No. 1 cast, eastern Pa. | 11.00 to 11.50 |
| No. 1 cast, Pittsburgh | 11.00 to 11.50 |
| No. 1 heavy cast (N. J. points) | 10.25 to 10.50 |
| Mall. iron, agricul., Cleveland | 9.00 to 9.50 |
| Mall. iron R. R., Cleveland | 9.00 to 9.25 |
| Malleable, railroad, Pittsburgh | 9.50 to 10.00 |
| Mall. R. R., Buffalo | 9.25 to 9.75 |
| Mall., R. R. east. Pa. | 8.50 to 9.00 |
| Bundled sheet, Pittsburgh | 8.00 to 8.25 |
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## Making Gray Iron Castings

(*Continued from page* 994.)

is done, it is a good investment. In this connection it is well to discuss the use of high silicon and other ferro-alloys in the foundry. The use of Scotch irons, that is softeners, or comparatively high silicon pig irons, is well known. The addition of this material to a mixture, chemically speaking, simply increases the average silicon, and hence overcomes hardness where too little of that element had been charged into the cupola. Going one step further, it is quite possible to charge ferro-silicon with plow points, which are quite low in silicon, and get good castings, but owing to irregularities in charging and melting, disastrous results are liable to occur at any moment. Hence the general rule of purchasing pig iron of about the composition wanted in the castings, plus the silicon which is burned out. If it becomes necessary to increase the silicon in one or two castings of a given heat of otherwise comparatively low silicon work, it may be added to the particular ladles of metal by charging the proper weight of high grade ferro-silicon in the cupola spout. This allows the alloy to heat up and melt as it gets into the ladle. Stirring with an iron rod and then pouring will give the results wanted.

Similarly with ferro-manganese, when it becomes necessary to use some of this alloy for deoxidation purposes where heavy steel scrap percentages have been used in the mixture. The effect is thus best obtained. Had the high grade ferro-silicon or ferro-manganese been melted directly in the cupola, much of its value would have been lost through oxidation while melting.

Where it is necessary to add more silicon or manganese than a ladle full of metal can stand without undue cooling, it is better to use high manganese or silicon pig irons direct, though with great care so that perfect mixing results.

In general, it may be said that the use of all the ferro-alloys should be avoided in cupola practice as much as possible. Not only are they expensive, but where deoxidation has become necessary, or where it is thought that the temperature may be increased, it is better to melt properly. Prevention is better than cure. Hence too much attention cannot be given the melting practice of the foundry. It is the nerve of the whole business. With things going wrong in the castings, no amount of care afterward will overcome the evil. The use of chemistry in the foundry is only to start the metal mixture right. It can easily be spoiled by melting in the wrong part of the cupola. But with the best of melting practice, a mixture of the wrong composition will not make good castings. The two things go hand in hand. Occasionally, whether through excessive dampness in the molding sand or other influences which may cause the metal to contain more combined carbon than it should, the castings will show up too hard in the machine shop. In these cases a short annealing will be very beneficial. This means bringing the casting up to a bright red heat, holding it for a few hours and then cooling slowly. Too low a temperature will not cause the breaking up of the combined carbon, and too long continued heat will injure the piece by surface oxidation. It might be called the beginning of the anneal of the malleable casting, and when conducted properly gives very serviceable results.

Finally, it may be mentioned that the American tendency is too much in the direction of dead soft castings. The constantly increasing cost of labor in finishing castings, in spite of the improved methods and materials used, brings a howl from the management when the metal runs a little hard. It were far better to follow the

European method of making a casting of metal suited to the service requirements, whether hard or soft, and adjusting the machining with this end in view. Designers would not then be so reckless in piling on weight because with very soft castings the factor of safety must be high.

It is not good to overdo this matter, either. When a casting is required with some 40,000 pounds per square inch strength, unless some very cogent reason exists for the employment of cast iron, cast steel should be used. Similarly where the lighter grade of castings are involved, a malleable casting often gives far better results in service than the heavier gray iron casting. The tendency to retain a given line of work in the wrong industry should therefore be discouraged, but on the other hand, there is no reason why cast iron should be replaced by any other metal when by proper manipulation and practice its excellencies for the purposes intended can be readily brought out.

## Manganese Steel and the Allotropic Theory

(*Continued from page* 1002.)

most readily produced by reheating austenitic steel for a sufficient length of time to a temperature exceeding 500 degrees but not 700 degrees.

In the first condition, which may be described as cementito-austenitic, the metal is non-magnetic, weak and lacking in ductility, while its hardness number is in the vicinity of 180.

The martensitic condition results from the tempering of austenite. The metal is now ferro-magnetic because of the presence of some alpha iron, while its hardness varies between 250 and 350, an increase due to the formation of a considerable amount of beta iron.

## Thermal Properties of Steam

"The Thermal Properties of Steam", by G. A. Goodenough, has been issued as Bulletin No. 75 of the Engineering Experiment Station of the University of Illinois. The bulletin presents a critical discussion of the experimental investigations of the various thermal properties of steam, an outline of the thermo-dynamic relations that must be satisfied, and finally the development of a general theory of superheated and saturated steam. As a basis for such a theory the well-known Munich experiments on specific volumes and specific heats are taken and properly correlated through the Clausius relation. The assumed characteristic "equation" for steam is shown to fit the experimental points with extreme accuracy, and other tests are given to show the superiority of the equation over Lunde's equation, which has heretofore been employed. The equation for specific heat gives a corresponding close agreement with the Knoblauch and Mollier points. Simple mathematical manipulation leads to explicit expressions for heat content and entropy, and various tests applied show that the values thus deduced are in excellent agreement with the best experimental evidence. The range of temperature through which the theory appears to be valid extends from 32 to 600 degrees Fahr. for saturated steam. The corresponding upper limit of pressure is above 1,500 pounds per square inch.

The November issue of "Drill Chips" published by the Cleveland Twist Drill Co., Cleveland, contains some interesting material, including a pointed chapter on war and business, an interesting dissertation on compensation and a part of a very interesting essay on the theory and design of twist drills.

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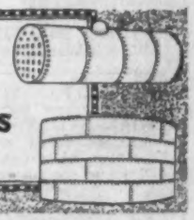

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